

Physics and Astronomy Matters

*a newsletter for alumni and friends of the
DEPARTMENT of PHYSICS and ASTRONOMY
at WAYNE STATE UNIVERSITY*

SPRING 2013

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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

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

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

continued on page 2

New Members of the Physics Faculty *continued from page 1*

deep into the past and into the very nature of the forces that govern our universe. Dr. Putschke 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. Putschke 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 interactions 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. Gil Paz

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 LHCb experiment at CERN and Belle-II in Japan. The third is to study the implications of the recently discovered Higgs-like particle at CERN on supersymmetric models of new physics.



Dr. Ed Cackett

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 imprint 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. Xiang-Qiang (Rosie) Chu

Dr. Xiang-Qiang (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 bio-

molecules, nanomaterials and their hydration water or surface water through neutron and X-ray scattering spectroscopy and theoretical modeling. She is attempting to reveal the underneath mystery of bio-macromolecules, especially proteins, DNA and RNAs. 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

Letter from the Department Chair

Dear Friends and Alumni of the Department,

As you have probably heard, the long sought-after Higgs boson has been discovered. A team of faculty, staff and students from our department collaborated in this historic discovery by participating in the experiments at CERN and contributing to the data analysis at CERN, Fermilab and Wayne State University.

Through the legacy left by the family of Professor Vaden Miles we are able to continue the yearly tradition of inviting world-renowned speakers to our campus. NASA astronaut Colonel Terry Virts delivered our 2012 Vaden W. Miles Lecture, and Professor James Gates Jr., professor of physics, director of the Center for String and Particle Theory at the University of Maryland, and Member of the President's Council of Advisors on Science and Technology, delivered our 2011 Vaden W. Miles Lecture.

Our faculty continue to be leaders in the research community by playing host to several conferences at Wayne State, including the on-campus OSAPS Fall conference and the Quark Matter 2012 satellite conference.

The Research Experience for Undergraduates (REU) summer program, funded by the National Science Foundation, continues to engage physics and astronomy undergraduates in cutting edge research projects in particle and nuclear physics, as well as astronomy and astrophysics. Another interdisciplinary summer research program, in physics and biomedical engineering, has been made possible in our department by the generous support from Richard J. Barber, Esq. Enrollment in our undergraduate and graduate academic programs continues to grow, and we have embarked on a concerted effort to increase our undergraduate population even further. Our outreach efforts have grown and so has attendance in our planetarium through K-12 school shows, public shows and lectures, and our new physics and astronomy camp, hosted these past two summers at our planetarium.

We are currently immersed in major building renovations which have caused some disruptions, but we are optimistic that these upgrades will be successful in providing us a number of newly renovated labs, as well as updated heating and cooling systems and a new elevator.

Through your continued generosity we are able to support the summer interdisciplinary research program for biomedical physics undergraduates, cultural exchange programs, scholarships for students, faculty and staff recognition awards, and an annual lectureship hosting internationally known speakers. With your help we can continue these wonderful programs. To make a contribution, please use the gift form found in this newsletter or visit clasweb.clas.wayne.edu/MakeaDifference. We are always glad to hear from you about your achievements and your life. As always, we invite you to arrange a visit with us and experience for yourself the excitement and positive changes happening in the department.

Regards,

Ratna Naik



continued from page 2

pressure and extremely low or very high temperatures. Proteins from hyperthermophilic (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 a 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. ■

Awards and Honors



Professor Sergei Voloshin



Dr. Punya Talagala



Professor Jerry Dunifer



Professor Walter Kauppila

Professor Sergei Voloshin was inducted into the Academy of Scholars of Wayne State University in 2012. The Academy represents a group of senior faculty members from all divisions of the university who are elected on the basis of academic accomplishments that have merited high acclaim, both at this university and at a national and international level. Election to the Academy is for lifetime membership.

The Richard J. Barber Faculty/Staff Award of the Department of Physics and Astronomy honors faculty or staff members whose efforts have elevated the stature of and have brought external recognition to our Department. Recent recipients of this Award are Professor Sergei Voloshin and Dr. Punya Talagala for 2011 and Professor Jerry Dunifer, Professor Walter Kauppila, Dawn Niedermiller and Patricia Domanski for 2012. Voloshin was selected for his outstanding contributions to theoretical and experimental high energy nuclear physics research, which has brought international recognition to the department. Talagala was selected for her remarkable and selfless efforts toward increasing the number of undergraduate majors through the biomedical physics program. Dunifer and Kauppila were awarded for their continuous service, as emeritus professors, in assisting us in our outreach programs. Niedermiller and Domanski were recognized for playing a pivotal role in transforming the planetarium into an excellent learning facility on campus.

The department is pleased to announce the establishment of two new endowed scholarships. These scholarships have been made possible by the generous and kind support of many donors. The

Bohm-Stewart Undergraduate Scholarship is made possible by the generosity of family and friends of Emeritus Professors Henry Bohm and Melbourne Stewart. Full time undergraduate students majoring in Physics and/or Astronomy are eligible to apply. The Bohm-Stewart Scholarship was given to Arthur Bowman and Mark E. Schott in 2012. The second scholarship, the Robert and Sandra Thomas Endowed Scholarship in Physics or Chinese Studies, is administered through the College of Liberal Arts and Sciences. This scholarship is open only to full-time and part-time undergraduate or graduate students majoring in Physics or Chinese Studies. The recipient of the 2012 Robert and Sandra Thomas Scholarship was Mary Hooker, an undergraduate major in our department.

Traditionally, our department has been giving annual awards to graduate teaching assistants who show outstanding efforts in providing a high level of teaching in undergraduate introductory physics laboratories. The recent recipients of the Daniel R. Gustafson Award are Edward Kramkowski (2011), Khadije Bazzi (2011), Ehab Abd Elhamid (2012) and Indika Wanniarchchchi (2012). AAPT Award includes the usual monetary grant as well as a subscription to the American Journal of Physics. The recent recipients of this Award are Pushkal Thapa (2011) and Ryan Gillard (2012).

The academic achievements and excellence of undergraduate physics majors are recognized by Vaden W. Miles Award in our Department. Generally a graduating senior is given the Award. The recent beneficiaries of this Award are Christopher DeYoung (2011) and Nathan S. Joseph (2012). ■

Discovery of a New Particle – the Higgs boson

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 Harr, 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 24/7 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 raised above the transition temperature because of heating from stray beam particles. However, in this case, there was a faulty connection between the superconducting wire and a copper bus bar, which normally carries the large current at room temperature. As a result of the bad connection, all of the current passed through the thin niobium-tin wire, which was heated to a high temperature. This caused a chain of disastrous events: the liquid nitrogen surrounding 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 finances had been stretched to build the LHC machine, further effort and expense were needed to repair the damage. The perseverance paid off; by 2010 the accelerator was repaired enough to test the operation of the LHC, but at a collision energy of only 7 TeV, less than half of the design energy of 14 TeV. The stakes were raised in

2011, when, in response to the financial crisis in the United States, operation of the Tevatron accelerator at Fermilab was terminated, eliminating the only facility other than the LHC that could perform the Higgs boson search. The CERN laboratory took the calculated risk of operating the LHC at an increased energy of 8 TeV, providing a more copious particle production, but at some risk of a catastrophic quench. The gamble paid off! By June of 2012, enough data had been collected to show clear evidence of a new particle of mass with energy equivalent of about 125 GeV, consistent with that expected of a Higgs boson. The new particle is seen to decay to a pair of photons or to four leptons (electrons or muons). The announcement on July 4th received tremendous world-wide interest with headlines about “the God particle” and the “key to the universe.”

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.

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 those 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, 10-12 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:

- In 2011: Fostering collaborative projects between biomedical physics and biomedical engineering at Wayne State University; Yeshitila Gebremichael (Biomedical Engineering) and Peter Hoffmann (Physics).
- In 2011: Reduction of non-specific uptake of functional iron oxide nanoparticles for targeted drug delivery applications; Gavin Lawes (Physics), Bhanu Jena (Physiology) and Norman Chang (Radiology).
- In 2011: The development of LiMnPO₄/graphene composite electrodes for advanced Li-ion batteries; Gholam-Abbas Nazri and Zhixian Zhou (Physics), and Prem Vaishnavi from Kettering University.
- In 2012: Visualization of pancreatic enzyme transportation system and identify key proteins by proteomic analysis; Takeshi Sakamoto and Jianjun Bao (Physics), and Xuequn Chen (Physiology).
- In 2012: Interdisciplinary summer research program in physics and biomedical engineering; Yeshitila Gebremichael (Biomedical Engineering) and Peter Hoffmann (Physics).

Our Department, and its faculty and students, greatly appreciate the continued support of the Richard J. Barber Fund. ■

Warchol Family Cultural Exchange Continues

A GENEROUS 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. R. Suryanarayanan of the Université Paris-Sud at Orsay. In December/January 2008-2009, Dr. Gavin 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. ■

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 stepped 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 have the Vaden W. Miles legacy to thank for this wonderful experience.



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



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 Molecular Machines Extract Order from Chaos*. Hoffmann, founder 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 book of 2012. It has been consistently listed in the top 10 bestsellers in the categories of biophysics and nanostructures on amazon.com. Professor Hoffmann was invited to give a talk on 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 2012 – a Jet 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 quenching had emerged. The workshop ended with an extended discussion of how to interpret the latest results using additional precision measurements to advance our understanding of the underlying picture of jet modification in heavy-ion collisions.

Dr. Gavin Lawes 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 including strong representation from graduate student researchers; a banquet featuring a lively discussion on the evolving role of physics education; and a planetarium show on black holes.

Dr. Takeshi Sakamoto and colleagues organized the Fall 2012 Michigan Microscopy & Microanalysis Meeting. It was held on November 2, 2012 at Soaring Eagle Convention Center in Mount Pleasant, MI. This meeting provided a great opportunity to learn about fluorescence microscopy and electron microscopy. Two prizes were given to the students with the best presentations and posters. ■

Dr. Weihofen's Generous Gift

Since 2008 Dr. William H. Weihofen, Wayne State University alumnus (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 Kaczor Teaching Award

FOR SEVERAL YEARS EMIL KACZOR worked in our department as the supervisor of undergraduate teaching laboratories. Recently, he donated funds to set up an endowed award in our department for graduate teaching assistants. The purpose of the 'Emil Kaczor and John & Mary Kaczor 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 to Wayne after completing nine straight semesters (1943 to 1946) of the accelerated undergraduate 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 marshal warnings of overcrowding!). Leading the cast was our Professor Everett Phelps, Detroit's first TV weatherman. (Jerry Hodak 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,

with Prof Vaden Miles as the lead author. It was a joint venture with others in the Chemistry and Geology Departments and the book, College Physical Science, was published by Harper and Row in 1974.

Also I took to writing and leaving, unobtrusively, in the physics labs a mimeo supply of lab instructions each week to replace the phased-out undergraduate manual of the "Old Guard" long since retired. Later, these mimeo instructions, with contributions and editing by other staff members, were collected and published as our 'official' general elementary physics manual under Kaczor-Payson editorship.

I have lately realized that my comfortable life today owes much to the flourishing economy of a bygone era and to the support of my parents, then employed at Packard Motors (father) and DeSoto (mother). My home was a sort of extension of my office and lab, with my parents often involved in my bring-home construction, assembly or paint projects.

Apart from a single planned one-month absence from my job, I rarely took any vacation time beyond a day or two. At the time of formal retirement I had long before accumulated the two years' limit (44 days) of earned vacation time. It was always a pleasure to come in around 5 or 6 a.m. to prepare the lecture rooms and labs and then go out at 7 a.m. breakfast to join in the camaraderie with the incoming custodians, tradesmen, and clericals at the campus restaurant.

In place of the small teaching college housed in "Old Main" in 1946 that I came to, our University is now a vast, high-powered educational and research complex spread over a large metro area. Hopefully this award (Emil Kaczor and John & Mary Kaczor Award) being presented will encourage continued effort and higher quality levels to further that growth. Last, but not least, may those in the awardees' home environment share in and feel amply rewarded for their contributions and faith in the student." ■

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. ■

Planetarium and the Office of Outreach

THE WSU PLANETARIUM is becoming a household name in the Detroit area – at least we hope so. More than 7,000 children and adults visited our planetarium in 2012. This is more than twice the number that attended in 2010! We can attribute this tremendous increase to several factors such as visits from K-12 school groups in the local area, planetarium show requirements for the Wayne State undergraduate astronomy course, the Camp Cosmos Summer Program for youth, our monthly lecture series for the general public, *Science Under the Dome*, public planetarium shows, and special events.

K-12 schools continue to book shows at our Planetarium to learn about the current night sky, view full dome films, and watch as we perform interactive demonstrations at solar-system scale using balloons. We frequently pair our planetarium shows with *Phantastic Physics Phenomena* demonstrations awing visitors with the popular fire tornado and liquid nitrogen experiments. Emeriti professors Walt Kauppila and Jerry Dunifer continue to present many of these sessions and we are ever so grateful to both of them. Physics faculty and physics students also participate in these school events.

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We continue to present shows for the NASA outreach program SEMAA (Science, Engineering, Mathematics, and Aerospace Academy) on Saturday mornings throughout the year. Undergraduate Rachael Merritt, a physics and astronomy dual major, is the newest addition to our Planetarium and Outreach team. Rachael has been sharing her enthusiasm for astronomy with the K-12 SEMAA attendees.

Physics faculty have added planetarium requirements to the undergraduate Astronomy (AST2010) course syllabus. In addition to the instructional astronomy lab, two additional planetarium shows are now required of students enrolled in this course. The first show consists of astronomy basics such as asterisms and constellations, the light year, solar system scale, and the full dome film *Two Pieces of Glass: the Amazing Telescope*. The second show includes stellar evolution, light spectra, and the full dome film *Wonders of the Universe*.

To reach our youngest (K-3) visitors, we purchased a new full dome film – *Zula Patrol: Down to Earth*. The hunt for Deliria Delight is on as she travels back in time to dump her toxic trash. The *Zula Patrol* will not let her succeed! This delightful film is entertaining

and educational, combining Earth and space science.

WSU Planetarium Coordinator and *Camp Cosmos* Director Dawn Niedermiller led two successful *Camp Cosmos* Summer Programs held in June 2011 and 2012. The department's two-week summer program combines astronomy, physics and general science. Base camp is held in the Planetarium. Campers engage in two weeks of hands-on activities, visit the Mort Harris Recreation and Fitness Center for good old-fashioned play, learn to use Starry Night (the software that drives the images on our planetarium dome), and visit local museums in the midtown cultural district. The June 2012 camp welcomed the Cranbrook Bats, and a new Solar System painting activity. We also expanded our Search for Extraterrestrial Intelligence (SETI) session to include a "create an alien activity." This team-building activity encouraged creative and analytical thinking. Our campers were assigned conditions of an exoplanet and were asked to determine the type of life, if any, they thought could develop there. This ended with an arts and crafts session to create their new life forms. The variety of life forms was endless and the kids left with a sense of accomplishment. *Camp Cosmos* is suggested for ages 12-15.

live NASA feed, and planetarium shows. Two other special events 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 Pruneau 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. Professor David Cinabro inspires crowds with his Cosmology on a Table Top demonstration!

The past two years we have been busy upgrading our Physics & Astronomy website, and creating a new Planetarium website. Our new websites are now live, and we invite you to visit to see what's up: <http://planetarium.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 publicly-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. ■

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 Harr 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 operation of cosmic ray detectors in local high schools.

During the March 2012 MasterClass, students and teachers analyzed data from the Compact Muon Solenoid (CMS) experiment at the CERN Large Hadron Collider (LHC) looking for signatures of W and Z Bosons. The two-week long on-campus summer research program consisted of 3 groups of 4 students each. Students learned how to operate the QuarkNet cosmic ray detectors, and how to design their own experiments using the detectors. These cosmic ray detectors are spending the academic year in local schools, and will come back to Wayne State campus during summer for another round of research. ■



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 1956 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 "Hank" Bohm, Thomas was mentored by Dr. Robert W. Morse, 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 Bohm, 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 a novel inspection technique, known as thermal wave imaging (TWI), which led to the founding of a company called Thermal Wave Imaging, Inc., owned and operated today by WSU Physics Ph.D.



recipient Dr. Steven Shepard. "If it wasn't for the institute," says Thomas, "TWI likely would never have been conceived."

THERMAL WAVE IMAGING

Thomas, Lawrence "Skip" Favro (emeritus professor of physics), Pao-Kuang "PK" Kuo (retired professor of physics) and Xiaoyan Han (professor of electrical and computer engineering, and Favro's former Ph.D. student) were pioneers of TWI. The team used time-varying heating, coupled with synchronous infrared and visible optical imaging techniques for subsurface materials characterization. Patents followed. Thomas recalled with a laugh the proceeds the founders received from their first license on a device called a single beam interferometer. "Normally, licensing and royalty revenue to WSU are first spent on legal fees and then a portion is disbursed to the inventors. The University waived this requirement on our first license, and after paying our taxes, we (Favro, Kuo and I) used the proceeds to pay for donuts in physics colloquia for a few years."

On the heels of their first patent license came success with the spinning-disk confocal optical microscope, which formed the Ph.D.

dissertation by Li Chen, the first WSU graduate student in physics recruited from Nanjing University. Three more confocal microscope patents followed and it wasn't long before the 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 has 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 (sonic infrared imaging of fatigue cracks) became the team's best invention for crack detection. The team by then included Engineering faculty members Xiaoyan Han and Golam Newaz, along with several graduate students from Physics. An ultrasonic welding gun was purchased, and Golam 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 resulted in 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 Shu-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 1985, and the 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 one 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 lin* (Chinese for ice cream) to our group meetings. We had *bing qi lin* 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 congratulations; I have become a mama huhu Dean Dean. In Chinese, *ma* is a horse and *hu* 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 two 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. "Being an experimentalist, I got all the Japanese and Chinese 101 students together for catered luncheons and we talked. I asked them if we should have Chinese and Japanese degree programs: their response was overwhelmingly yes!"

continued on page 14

continued from page 13

A Bachelor of Arts in Asian Studies with concentrations in Chinese and Japanese language and culture followed. Thomas hired faculty in the areas of Political Science, History, Sociology, Philosophy and Linguistics. And, his vision for Asian Studies was expanding beyond the WSU campus. But, there was a problem – funding.

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 in China, 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 Munich (JYM) which gives talented undergraduates in German Studies the opportunity to study abroad," says Thomas. "I told the Wangs about this program, together with a Rural Home-Stay Program that had just begun from WSU. They were impressed and felt a similar program aimed at nurturing relations between the USA and China was needed. They were especially interested in helping kids in rural China to overcome poverty."

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-million dollar investment given to Tsinghua University by the Wangs, the first summer program in China opened in 2006 with approximately 400 Chinese and American undergraduates participating, 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 2007 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 11th floor of the Maccabees Building conversing 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 parks. 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 all your heart.* And, we have no doubt Bob Thomas will. ■

In Memory of Dr. Henry Bohm

HENRY V. BOHM, an emeritus professor of physics at Wayne State University, died 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.

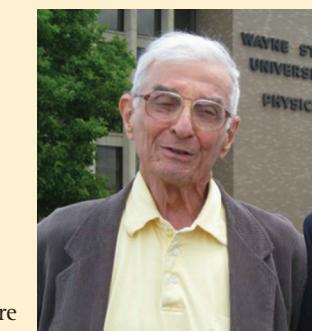
At Wayne Henry had an active research group studying the properties of metals, and, along with several others, was instrumental in establishing the experimental research programs in the department. At that time the experimental part of the department's research was housed on the second floor of a commercial 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 Roellig 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 department 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 Levys 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 five 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

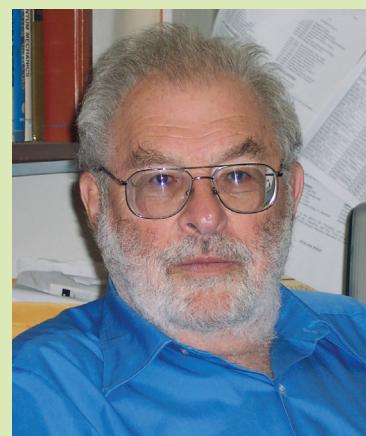
PROFESSOR JHY-JIUN CHANG, affectionately known as JJ by his friends and colleagues, retired at the end of 2011 academic year after serving the department for 34 years. JJ received his Ph.D. in physics from Rutgers in 1973. He joined our department in Fall 1977, as an Assistant Professor, following his 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, JJ worked on the nonequilibrium behavior of superconductors. In his theoretical work he used a kinetic equation approach to investigate the properties of nonequilibrium superconductors. Jhy-Jiun was a recipient of the prestigious WSU Career Development Chair Award in 1985.



Professor Jhy-Jiun Chang



Professor Pao-Kuang Kuo



Professor Alvin M. Saperstein

Jhy-Jiun was a very 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. JJ 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 JJ 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

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

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

Alumni Notes

Petru Fodor (Ph.D. 2002) was promoted, in 2012, to Associate Professor of physics at Cleveland State University. Prior to joining Cleveland State University in 2006, Petru 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, Quarkonics 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.

Mohamad Elnimr (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 University of Peshawar in Pakistan.

Sarah Lapointe, 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 **Suneetha Devpura** (Ph.D. 2012) as well as **Essa Mayyas** (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.

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. In addition, these generous funds are used to refurbish our student computer lab with new computers, software, desks, and chairs. If you are thinking about making a tax-deductible gift to our department, please see the Wayne State Fund Gift Form in this newsletter.

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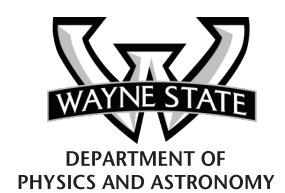
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