

# Physics *and* Astronomy Matters

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

www.cla.s.wayne.edu/physics

DECEMBER 2008

## New Members of the Physics Faculty

In order to continue to build upon the strength of our Department in the research area of nanophysics we have successfully recruited two new faculty members during the last two years.



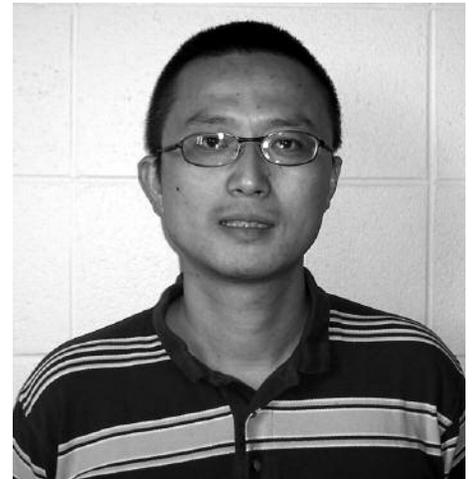
Dr. Zhi-Feng Huang

Dr. Zhi-Feng Huang joined our Department as an assistant professor in the Fall of 2006. He received his Ph.D. in physics from Tsinghua University of China, and was a research associate at McGill University of Canada before joining the Department. His previous research involved topics of theoretical condensed matter,

statistical, and computational physics. These include phase ordering and kinetic surface roughening in epitaxial growth, morphological and compositional instabilities of semiconductor strained films and multilayers/superlattices, mesophase dynamics and hydrodynamic effects in block copolymers, and pattern formation and evolution in nonequilibrium systems.

Dr. Huang's research at Wayne State focuses on the modeling and simulation of nanopattern self-assembly in both soft and solid complex material systems. The current research involves two of the most important and advanced areas of nanostructure fabrication: strained film epitaxy for the growth of quantum dots or nanowires, and block copolymer thin film ordering as applied to soft-template nanolithography. The emphasis of the first area is on understanding the interplay between various key factors controlling nanostructure formation in semiconductor films, particularly the impact of strain and stress on surface/interface profiles and composition distribution, surface vs. interlayer mass transport, and the dependence on growth parameters such as temperature and growth rate. The research on block copolymer thin films aims to control and achieve the long range order in

nanostructured but defected film patterns, a crucial step towards device applications. Efforts are put on the stability, dynamics, and removal of topological defects in this nonequilibrium system, and also on the



Dr. Zhixian Zhou

effects of hydrodynamic coupling, processing temperature, and the directed self-assembly processes which are achieved via external confinements on the system. Huang's research is based on theoretical approaches and analyses at multiple scales, addressing fundamental mechanisms underlying these nonequilibrium and

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## Letter From the Department Chair

### Dear Friends and Alumni of the Department,

The year 2008 was an exciting time for the Department of Physics and Astronomy with the implementation of our new undergraduate Biomedical Physics major. This new and unique program is a great fit with our ongoing research collaborations between Physics and the Department of Biology and the Medical School. Our undergraduate enrollment numbers doubled under the new program with 30 declared Biomedical Physics majors, as well as an increase in our Physics majors. At the same time, we have seen an appreciable increase in our graduate enrollments!

The year 2009 has been declared the International Year of Astronomy by the United Nations. Four hundred years ago Galileo turned his telescope to the sky and began observing the cosmos. For this occasion, we are planning to upgrade our planetarium to a digital facility and add an interactive room where students can experience computer simulations and science demonstrations. Our goal is to reach out to Michigan students and the public and share with them the awe-inspiring nature of science. Our Department of Physics and Astronomy continues to be dedicated to outreach programs in the community. What better time to contribute to our Planetarium Fund!

Meanwhile, in the basement of our Physics building, the nuclear physics group is leading an international project to build a calorimeter, an important upgrade to the detector for ALICE (a large ion collider experiment). ALICE is part of LHC (Large Hadron Collider) at CERN in Geneva, Switzerland. This is just one example of how we continue to lead internationally recognized research and provide cutting-edge training opportunities to our students.

As a trendsetter with our Biomedical Physics major, future growth of our planetarium facility, and our research collaborations with the international community, the Department of Physics and Astronomy continues to build its reputation as a leader and innovator.

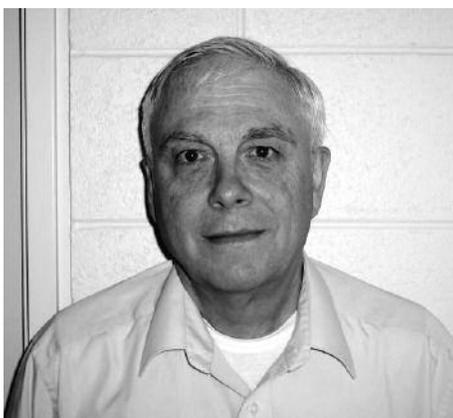
We appreciate your generous support and we ask that you consider contributing to one of our departmental gift funds. Through the generous gifts of many donors, endowments have been established which provide scholarships to undergraduate and graduate physics students, funding for cultural exchanges and outreach programs, faculty/staff awards and research support for the Department of Physics and Astronomy. With your help we can continue these important programs. More details can be found in this newsletter and by visiting our webpage at [www.clas.wayne.edu/physics/](http://www.clas.wayne.edu/physics/).

Regards,  
Ratna Naik



Ratna Naik

## Dunifer and Chen Retire



Professor Gerald L. Dunifer

Professor Gerald L. Dunifer fully retired at the end of the 2006 academic year after serving the Department for 35 years. Jerry joined our Department in 1971 after spending two post-doctoral appointments. The first one was at University of California at San Diego, where he had earned the PhD in 1968. It was followed by a two-year appointment at the famous and excellent Bell Laboratories in Murray Hill, New Jersey. Dunifer was promoted to full professor in 1985 and served as Associate Chair of the Department from 1998 through 2001.

University faculty members have responsibilities in three areas of endeavor: teaching, research, and service. Jerry

excelled in all three! He taught courses at all levels, championed the Department's interest in expanding its Astronomy offerings, and was always regarded as a fine classroom lecturer accessible to students. His "service" activities went well beyond the usual Department committee assignments; for example, for about a dozen years he had leadership roles in the annual Junior Science and Humanities Symposium for Southeastern Michigan high school students. Additionally, he served on various College and University committee assignments.

As a research physicist Jerry's primary area of interest is broadly described as

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## Awards and Honors

Recently three of our faculty members received the Career Development Chair Award. These awards, supported by the University, are provided to tenured faculty members in early stages of their careers. Significant unrestricted financial support provided by these awards is used to fund research activities as well as to cover a portion of the chairholder's teaching duties.

**Sean Gavin** and **Peter Hoffmann** were the recipients of the Career Development Chair Award during 2006 and **Alexey Petrov** received the Award in 2007.

**Ratna Naik** was the recipient of the 2008 Outstanding Graduate Mentor Award. This Award, supported by the Graduate School, recognizes the abilities of those faculty members who inspire, support and advise students so that the students can complete their graduate degrees and become members of the professional community in an expeditious manner.

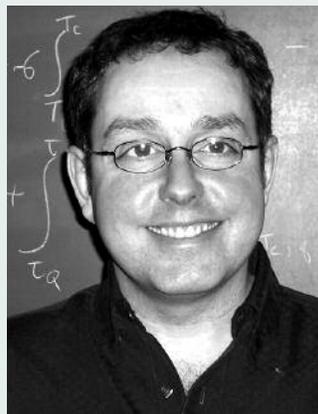
College of Liberal Arts and Sciences (CLAS) has supported the excellent teaching by awarding annually a few teaching awards to faculty members who show effective and innovative teaching methods at the undergraduate and graduate levels. In our Department **Gavin Lawes** and **Jo Wadehra** were the recipients of the 2007 CLAS teaching awards and **Steve Rehse** was the recipient of the 2008 CLAS teaching award.

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 **Sean Gavin** (2006), **Emil Kaczor** (2007), **Jose Riso** (2007) and **Peter Hoffmann** (2008).

As a tradition, our department has been giving 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 have been **Qassem Mohaidat** (2007) and **Champika Gamage** (2008). 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 **Caleb Ryder** (2007) and **Mohammad Alfiky** (2008).

The academic achievements and excellence of undergraduate physics majors is recognized by Vaden Miles Award in our Department. The recent beneficiaries of this Award have been **Xhorlina Marko** (2007), **Joshua Kim** (2007) and **Christian Hammill** (2008).

For the last several years, the Department of Physics and Astronomy has been annually awarding scholarships to full-time undergraduate physics majors to ensure that the high quality and caliber of undergraduate education is maintained. The recent recipients of these scholarships have been **Xhorlina Marko** (2006-07), **Christian Hammill** (2006-07), **Erin Nagelkirk** (2007-08) and **Lei Gao** (2007-08). ■



Thomas Cormier



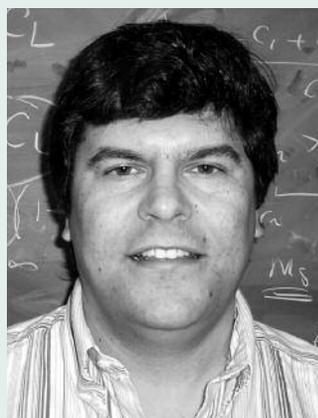
Gavin Lawes



Peter Hoffmann



Jo Wadehra



Alexey Petrov



Ratna Naik

## The George B. & Eveline R. Beard Endowed Student Prize

The family and colleagues of the late Professor George B. Beard and Eveline R. Beard have created the George B. & Eveline R. Beard Endowed Student Prize. This award was made possible through the combined generosity of Professor Beard's loving sons Dr. Kevin B. Beard, William B. Beard, Glenn B. Beard, Randall B. Beard, Richard Beard (Professor Beard's brother), Keith McDonald, widower of Dr. Beard's only daughter Lisa, and other relatives/friends as well as departmental colleagues. Prizes awarded recognize exceptional achievement by students involved in research projects within the Department of Physics and Astronomy and support funding for colloquium, seminars and various student events.

Dr. George B. Beard attended Harvard University on scholarship and graduated in 1947. He went on to earn his Ph.D. in nuclear physics from the University of Michigan and joined the Physics Department at Michigan State University in 1954. The following year he married Eveline Roehling. Dr. Beard came to Wayne State University in 1960, where he remained as a member of the Physics Department until his death in 2007. Dr. Beard's research focused primarily on the energy levels of various nuclei, often using nuclear resonance fluorescence techniques. Later he applied proton-induced X-ray techniques to examine a variety of materials.

Dr. Beard served as Chair of the Physics Department, Chair of the Computer Science

Department and Associate Dean of the College of Liberal Arts.

Mrs. Eveline R. Beard (formerly Eveline Roehling) earned B.S. and M.S. degrees from Wayne State University. Mrs. Beard actively participated in the Physics Department, coordinating and hosting numerous departmental functions. She died in 1998.

Dr. Beard was known for his dedication to students. He not only encouraged those graduate students who undertook research under his direction, but nurtured research interests and capabilities of undergraduates throughout the department. ■

### Dunifer and Chen Retire

*continued from page 2*



*Juei-Teng Chen*

experimental work on Collective Electron Modes in Metals. His accomplishments are numerous – marked by more than 30 refereed journal publications, and a bushel full of invited papers at national and international professional meetings. In his dissertation work, he discovered the existence of spin waves in sodium and potassium. His papers are noteworthy for

the painstakingly achieved accuracy and reliability of the numerical data presented. The National Science Foundation supported his work almost continuously for more than 25 years during which more than 15 students earned their Master's and PhD degrees under his guidance.

The Emeritus Professor Dunifer has not been idle. In addition to his long pursued avocation of sailing – he has owned, partly or wholly, sailboats for a good many years – in the last couple of years he has learned to pilot single engine planes of increasing sophistication. His wife Caroline Morgan (also Professor of Physics) and his colleagues and friends get to see him on the rare occasions when his feet are planted on land!

After serving for 38 years in the Department of Physics Professor Juei-Teng Chen retired in May 2008. J.T. received his B.S. degree from Tunghai University, Taiwan, and his M.S. and Ph.D. degrees from the University of Waterloo, Ontario, Canada. After a two year postdoctoral

fellowship at the University of Pennsylvania, he came to Wayne State University in 1970 as an assistant professor and rose through the ranks to professor. He also served as department chairman for the period 2003-2005.

J.T.'s research was in the area of condensed matter physics and, in particular, focused on Josephson junctions and high temperature superconductors. He published more than 80 refereed articles in professional journals, and he was the thesis adviser to seven master degree students and ten Ph. D. students.

J.T. played college baseball and coached little league for a number of years here in Michigan. But as retirement neared J.T. decided he needed a sport that required fewer participants, so he took up golf and has developed into an accomplished player. His colleagues and students wish J.T. a long and happy retirement. ■

## Generous Gift from Dr. William H. Weihofen

In a letter to the College of Liberal Arts and Sciences, Dr. William H. Weihofen, Wayne State University alumnus (Ph.D. 1969), talked of his appreciation and how he “greatly enjoyed and profited” from his experiences at WSU through interactions with faculty and students. As an expression of his gratitude, Dr. Weihofen has given generously to the Department of Physics and Astronomy, in honor of his thesis advisor, Distinguished Professor Suraj N. Gupta.

### Following is an account of Dr. Weihofen’s life and career, written in his own words:

*I received my B.S. degree from Caltech in 1962 and decided to try for a career in solid state physics, a rapidly growing field at the time. But my choice of graduate school was unfortunately overrated in that area, so after receiving my M.S. degree I was drawn into the equally exciting study of high-energy particle physics. A well-known quantum field theoretician took me under his wing for a year and a half before he accepted a position in Japan. Other “particle theorists” in my Physics department left also, and I found myself at odds with the department about my future. One of my cohorts, Martin Rayl, was a WSU graduate; he suggested I contact Distinguished Professor Suraj N. Gupta to discuss the possibility of working with him. I did that. The “Gupta-Bleuler” method of quantizing certain fields was already known to me, and I could offer him considerably more experience than most graduate students. He accepted me in 1967.*

*Prof. Gupta was, like his published papers, rigorous and thoughtful. I found his*

*classes easy, because I had at least two years head start on his other students; nonetheless, they were concise and enlightening. We got along well, with good rapport. He inspired me to be both careful and useful. When a paper he had requested relevant to our research arrived completely in Russian, his annoyance was assuaged by my ability to give him a quick and accurate translation.*

*One of the things I found worth doing at my previous graduate school was to run informal seminars for grad students only, where they could give talks to each other on their fields of expertise and exchange information and advice. I did the same at WSU. The students, like the faculty at the WSU Department of Physics and Astronomy, had a relaxed but no less intense attitude toward their work. We enjoyed gaining experience at these “practice seminars.”*

*In general, the social climate was friendly and supportive. After I attained my Ph.D. in 1969, I stayed on as a post-doc for another year and a half, considering my time well*

*spent in teaching and research.*

*My professional career began in 1972, with a post-doctoral position in the Theoretical Division of Los Alamos Scientific Laboratory (LASL), as it was then known. There followed a series of jobs at LASL for the next six years, at which time the glut of new physicists and dearth of new jobs resulted in an early retirement. Thereafter I became more engaged in the real world, in investing and outdoor activities, including traveling and social efforts.*

*My life as a whole, and investing in particular, have been rewarding. Now it’s time to share. Wayne State occupies a significant place in my fond memories; it deserves my support. ■*

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**Dr. Weihofen’s unrestricted gift enables the Department of Physics and Astronomy to use the financial support across-the-board, for educational scholarships, research, and faculty/staff projects.**

## Cultural Exchange Possible Through Generosity of Warchol Family

In 2006, a generous gift from the Warchol family established a cultural exchange program that gave two Wayne State physics students the opportunity to participate in research collaborations with Dr. R. Suryanarayanan at the Université Paris-Sud at Orsay, and to experience the culture of France.

Through the continued generosity of Mr. Frank Warchol and Mrs. Jane Warchol, first-

year graduate students Timothy James and Christian Hammill, will visit the Indian Institute of Science in Bangalore and the Indian Institute of Technology Madras in Chennai, India. Professor Gavin Lawes, Assistant Professor of Physics, will accompany the students at the end of December 2008 through mid-January 2009. “We wanted to give our American students the chance to travel to India and expose

them to research in other countries. India is a natural fit for this exchange as they are an emerging world-leader in scientific research, particularly in the field of materials science,” explained Professor Lawes.

The host for the exchange is Professor M.S. Ramachandran Rao (IIT Madras), with Dr. Suryanarayanan providing assistance to facilitate the collaboration. Professor Ramachandran is an expert on the synthesis

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## Alumni Notes

**Charles Bloch** (B.S. 1978) is currently working as an Associate Professor in the Baylor College of Medicine in Houston, Texas.

**David G. Volker** (B.S. 1984) worked for United Technologies, General Dynamics and Ford Motor since graduating from our Department. He is currently an engineering supervisor at Ford Motor Company with Six Sigma Master Black Belt, using physics and statistics in problem solving and failure mode avoidance on the company's products worldwide.

**Matthew P. Krynicki** (B.S. 1993) completed his Ph.D. in Physics in 2006 from the University of Alaska at Fairbanks. He is currently a physics and astronomy instructor at Bay de Noc Community College in Escanaba, Michigan.

**R. A. Lukaszew** (Ph. D. 1996) is currently an Associate Professor in the Department of Applied Sciences and Physics at the College of William and Mary in Williamsburg, Virginia.

**Sithy Maharoo** (Ph. D. 2000) is working as a professional tutor of Physics and Mathematics at Manor College in Jenkins Town, Pennsylvania.

**Eric J. Luckwald** (B.S. 2001) completed his MA (2005) and PhD (2007) in Physics and a MA (2006) in Economics from the University of California at Santa Barbara. He is currently a Staff Scientist at Arete Associates in Northridge, California.

**Randall Furnas** (B.S. 2006) is working at Roush Industries as a NVH project engineer. He writes, "... at first the job market is a little daunting without an advanced degree, but I ended up being hired over other candidates with ME degrees. It is possible to find very rewarding, and well paying work with a B.S. in Physics."

**Vivek Batra** (B.S. 2006) is in third year of medical school at SUNY Upstate Medical University in Syracuse, New York. He writes, "I think a physics major opens many useful opportunities because it inculcates a logical and rational way of approaching problems. This summer I worked in a project on cardiovascular research, and the professor was using partial differential equations to model reflections of waves in media having different ionic properties."

**Jonathan Diedrich** (M.S. 2007) is working as Principal Engineer in the Integrated Space Systems Group of General Dynamics Advanced Information Systems in Ypsilanti, Michigan. He is working on internal research and development projects of his company. Results of his IR&D efforts will flow directly into remote sensing capability for defense customers.

**Narmatha Jeyasingham** (M.S. 2007) has been working as adjunct faculty in the Department of Physics of Kettering University in Flint, Michigan.

**Mohammad Alfiky** (Ph.D. 2008) is currently a lecturer at the Ain Shams University in Cairo, Egypt. ■

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## In Memory of Karl F. Canter: Pioneer of the Positron Studies

Dr. Karl F. Canter, Wayne State University alumnus, and Professor of Physics at Brandeis University, died September 24, 2006, after a long battle with cancer. He was 62 years old.

Dr. Canter, known for his research on positrons, the antiparticles of electrons, and biophysics research surrounding the organism *Magnetotactic Multicellular Prokaryote* (MMP), received his B.S. degree in 1965 and his Ph.D. in 1970 from Wayne State University. He continued with a post-doctoral position at the University College, London, and in 1972 accepted a position at Brandeis University, Waltham, MA. In 1978, he received the Sloan Fellowship for Basic Research. Dr. Canter also served as Department Chair and member of the Faculty Senate at Brandeis.

While at Brandeis University, his main contribution was developing a practical way of slowing down high energy positrons to make focused and controlled beams. This resulted in a series of experiments which ranged from detecting Lyman alpha radiation and measuring Lamb Shift in the positronium atom, and construction of the first positron re-emission microscope.

Later, Dr. Canter's research expanded to biophysics. The organism *Magnetotactic Multicellular Prokaryote* (MMP) captured his attention. (Aggregates of these bacterial cells are linked together and function as a single organism.) Dr. Canter studied MMP and its "ping-pong" behavior in magnetic fields, and his research group was the first to observe and document reproduction of MMP by binary fission.

Dr. Canter was also a gifted musician. He played violin as a child with the Detroit Youth Orchestra and in later years turned his talents to classical guitar, rock guitar, and sitar.

Dr. Canter was a dedicated and passionate teacher, one who cared deeply about the education of his students. Professor Leonard Roellig, Dr. Canter's doctoral research supervisor, recalled, "Karl Canter was a true scientist. Albert Einstein once said curiosity is more important than knowledge. Karl had both. He was one of the early pioneers to study how the positron, the anti-particle of the electron, interacted with matter. His fascination with the unknown made him a great teacher, imparting his sense of curiosity and knowledge to his students." ■



**New Members** *continued from page 1*

nonlinear phenomena.

Dr. Zhixian Zhou joined our Department as an assistant professor in August 2007. He received his Ph.D. in Physics from Florida State University in 2004. His thesis research focused on the electrical transport, magnetic and thermodynamic properties of novel magnetic and correlated electron materials in high magnetic fields and at low temperatures. After receiving his Ph.D., Zhou joined the Oak Ridge National Laboratory as a postdoctoral research associate investigating individual one-dimensional (1D) and quasi-1D nanoscale materials, employing state-of-the-art nanofabrication techniques and low temperature electrical transport

measurements. During this time, Zhou developed a method that enables batch fabrication of individual single wall carbon nanotube devices, and demonstrated that the defect level in the SWNTs can be controlled during growth and characterized by low temperature electrical transport measurements.

Zhou's research at Wayne State University centers on understanding the fundamental properties of materials at nanometer scale and exploring their applications for electronic devices and sensors. His current research interests consist of chemically derived graphene flakes and nanoribbons, superconducting nanowires, and magnetic nanoparticles. Zhou's work on chemically

derived graphene flakes and nanoribbons is focused on investigating the charge transport mechanisms and quantum mechanical phenomena in graphene with restricted lateral dimensions. He is also studying the electrical transport properties of chemically synthesized individual superconducting nanowires to address the fundamental question of superconductivity in 1D and quasi-1D systems. In collaboration with Dr. Gavin Lawes of our Department, Zhou is investigating the spin-dependent electron transport properties of magnetic nanoparticles for potential spin electronic and sensing applications. ■

**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 June 2006 to October 2008. 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, our student computer lab has been completely refurbished with new computers, software, desks, and chairs as a result of the generosity of our alumni, faculty, and friends who contributed to these funds. If you are considering making a tax-deductible gift to our Department, please see the Wayne State Fund Gift Form in this newsletter.

**Individual Donors**

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## ALICE-USA Project: Our Participation

A group of WSU faculty (Professors Cormier, Bellwied, Pruneau, and Voloshin), post docs and students in the Department of Physics and Astronomy are leading an international effort to upgrade ALICE (A Large Ion Collider Experiment) at the Large Hadron Collider (LHC) of the European Center for Nuclear Research (CERN), Geneva, Switzerland. The upgrade, currently under construction in the Physics Department, consists of a detector called ALICE-EMCal, an electromagnetic calorimeter designed to make precise measurements of the energy of particles produced in nuclear collisions at the LHC. Professor Cormier is the Principal Investigator and Project Director of the ALICE-USA project. He also serves as Project Manager of the combined International ALICE-EMCal project, and in this capacity, coordinates U.S., French and Italian efforts in the construction of the calorimeter.

Professor Cormier and the nuclear physics group at WSU were selected for this project because of their world-class reputation and expertise in the areas of design, construction and implementation of electromagnetic calorimeters. The group designed, built and operated other large devices as part of their contribution to the E864 experiment at the Alternating Gradient Synchrotron (AGS) and the STAR experiment at the Relativistic Heavy Ion Collider (RHIC) of the Brookhaven National Laboratory. They also made significant contributions to software and data analysis of these experiments.

The group led and contributed to many key aspects of the RHIC physics program. Most relevant for the future WSU program at CERN is research on an entirely new sector of experimental studies: high momentum particles produced in ultra-relativistic nucleus-nucleus collisions. Unlike

the particles that make up bulk matter, very high momentum particles are quite rare. The collision events that contain these very high momentum particles are mixed in a stream of thousands to millions of collisions per second. The identification of these rare particles requires use of fast detectors capable of direct energy measurements of particles. These detectors are known, for historical reasons, as calorimeters. The calorimeter, designed by the WSU group, specializes in measuring the electromagnetic energy of the particles emerging from nuclear collisions. Essential components of the calorimeter components are being built at the Department of Physics and Astronomy. The calorimeter components will be progressively assembled at ALICE during the next four years. When completed, the construction will yield a 150-ton instrument. The first portion, one-sixth of the ALICE –USA EMCal, will be installed at CERN in February 2009.

“The EMCal uses a combination of radiator and energy sampling devices,” said Professor Pruneau. He went on to compare the calorimeter to a “multi-layered club sandwich comprised of lead and scintillator sheets.” The lead sheets, acting as radiators, are the main site of electromagnetic interactions (collisions between particles) and the sampling scintillator sheets detect energy released in the radiator material. The scintillator material produces an amount of light proportional to the particle’s energy and funnels this light through optical fibers into specially designed light sensors. These sensors produce electric signals that are then converted to digital data. The data produced is written to storage media. Physicists of the ALICE collaboration will carry the analysis of this data. The analysis process may take from a few months to

many years of detailed studies, and shall result in a deeper understanding of the properties of nuclear matter at ultra high temperature and density.

WSU’s past research at RHIC (Relativistic Heavy Ion Collider at Brookhaven National Laboratory, New York) has shown conclusively that collisions of ultra-relativistic nuclei produce small samples of matter at temperatures and densities that have not existed since the first few microseconds after the Big Bang. At the temperatures and densities reached in these collisions, ordinary matter composed of neutrons and protons can no longer exist – it is melted into its constituent quarks and gluons. Consequently, the sample of matter produced in RHIC and future LHC collisions is commonly referred to as a quark gluon plasma or QGP. This matter filled the universe for a period of a few microseconds after the beginning of the universe during the so-called Big Bang. It is the detailed study of this exotic state of matter that motivates the WSU nuclear physics group in its research at the LHC.

Beginning in 2009 and extending over the next 5 to 10 years, the WSU nuclear physics group will play a leading role in the study of quark matter at the LHC – characterizing its basic properties, exploring its dynamic evolution, collective phenomena and correlation structure. Beyond this, the WSU group hopes to engage in a search for some of the new exotic phenomena that have been predicted to occur at the staggering energy densities produced in Pb + Pb collisions at the LHC such as micro black holes, manifestations of extra dimensions and perhaps evidence for the totally symmetric form of matter known as the Chiral Condensate. ■

## Nobel Laureate Visits WSU

Sunlight passed through a four by four inch grating pressed onto the window behind Professor Steven Rehse's chair and displayed a beautiful rainbow on the wall of his office. "As the light changes during the day, the rainbow moves around my office," commented Rehse, an AMO (Atomic Molecular & Optical) Physicist in the Department of Physics and Astronomy. Rehse sat back in his chair, sunlight streaming over his



Dr. Eric Cornell

*"Stone cold science: Bose-Einstein condensation and the weird world of physics a millionth of a degree above absolute zero."*

— Dr. Eric Cornell

head, and talked of the events which led to the April 2008 visit of Nobel Laureate, Dr. Eric Cornell, to our Department. Dr. Cornell received the 2001 Nobel Prize in Physics for his work on an extreme state of matter known as the Bose-Einstein Condensate.

Annually, the Department of Physics and Astronomy hosts the Vaden-Miles Endowed Lecture which strives to bring a world-class researcher to the university. Rehse, asked to organize the 2007-2008 Lecture, had an idea. "I had seen Dr. Cornell speak and he brought the house down. He was a phenomenal speaker with the ability to connect with the audience and explain complicated topics at a lay person's level." As an optical physicist, Rehse wanted to expose the university to the excellent work being done in the area of laser science. So in 2006, Rehse submitted an application to the American Physical Society – Division of Laser Science, for participation in the Distinguished Traveling Lecturer (DTL) program. The DTL program partners universities with world-class lecturers - but

there is a stipulation: the visit must be student-based, maximizing interaction between the lecturer and students. No problem. Rehse's application included a detailed two-day schedule filled with student/lecturer events. Word came faster than expected: Dr. Cornell had accepted the invitation and the APS would pick up the tab.

The morning of Wednesday, April 9th

arrived and with it, Dr. Eric Cornell. Dr. Cornell, a young and accomplished researcher, received his Ph.D. in 1990 from the Massachusetts Institute of Technology, and by 2001, was awarded the Nobel Prize in Physics along with Drs. Carl Wieman and Wolfgang Ketterle.

During his visit with us Dr. Cornell moved from classroom to classroom throughout the day. He presented for 10 minutes and then held open forum sessions. "You can ask me anything you want....including, what the heck happened to my arm," he joked. Quickly the ice broke and initially nervous students warmed to his outgoing personality. Lively and varied discussions followed (including Dr. Cornell's account of his brush with death at the hands of flesh-eating bacteria that robbed him of his arm). "For an undergraduate to talk with a Nobel Laureate is unique. He really connected with the undergraduate and graduate students during classroom sessions, lunches and an ice cream social," commented Rehse.

The first day's activities ended with a department colloquium attended by students and faculty. In his lecture, "Why is Warm Glass Stickier Than Cold Glass?," Dr. Cornell spoke of "fluctuating electric fields in empty space," and used descriptive phrases like "spooky-seeming" to get his point across. His enthusiasm for science spread throughout the audience.

A special dinner was held the evening of April 9th, in honor of Dr. Cornell. In past years, a local restaurant was selected, but on Sunday night, April 6th, Rehse received a call from Professor Ratna Naik, Chair of the Department of Physics and Astronomy. She had received word that Dr. and Mrs. Levy, local prominent philanthropists, wanted to host the event. The department accepted.

Dr. Stan Levy, a retired medical doctor and adjunct faculty at the WSU Medical School, and his wife Mrs. Rita Levy, an ancient manuscript aficionado, hosted a fabulous dinner. Much to everyone's surprise, the Levys had built an addition to their home, a library, to display an extensive collection of science books, literary works, art, and memorabilia. Excitement spread among the guests as they perused early editions of famous science books, like Newton's Principia, and stood in-awe at displays of rocks and minerals, paintings by Miro and ancient Byzantine manuscripts. The collection was fantastic!

But the main theme throughout was that of Dr. Albert Einstein. As a young man, Dr. Levy was a student at Princeton University. One day he and a friend were walking on campus when they happened to meet Einstein. The three conversed as they walked home. Some time later, Dr. Levy found himself sitting next to Einstein at a Passover dinner. These encounters sparked a lifelong interest in the life and works of Einstein. Among the Levy collection is a rare bronze sculpture of Einstein and a letter from Einstein to Sigmund Freud.

The second day of Dr. Cornell's visit started with a walking tour of the WSU campus. This quickly evolved into a brisk jog with students and faculty on the chilly

## New Biomedical Physics Program: National Trendsetter

streets of Detroit. Lunch was followed by a physics research poster session and public lecture in the WSU David Adamany Undergraduate Library, Bernath Auditorium.

Rehse wanted to maximize student exposure “so the public could see what our undergraduate students are doing” and decided to have a poster session in the library. “People had to walk past the posters to get to the auditorium,” said Rehse. The exposure was great for the undergraduates and it was such a good idea that Dr. Cornell was almost late for his talk. “Eric was very interested in the posters and spent time with every student there, so much so, that he would have been late for his talk, had I not reminded him,” smiled Rehse. Undergraduates from Wayne State University, University of Michigan – Dearborn, University of Windsor – Ontario, and Kettering University participated in the poster session.

The finale of the day came as Dr. Cornell presented his talk, “Stone cold science: Bose-Einstein condensation and the weird world of physics a millionth of a degree above absolute zero.” He delivered his talk to a standing-room-only crowd. He spoke of his research and breathed life into a subject difficult to understand. Afterward, the overwhelming comment from the audience was, “wow.” “Those who heard him speak could not get over how he was able to explain, with ease, such a difficult topic,” said Rehse. Other comments were that Dr. Cornell was “funny,” “clever,” and “amazing.”

Through his intellect and warm sense of humor, Dr. Cornell “connected” with all who crossed his path and even though Dr. Cornell is not faculty at WSU, “in a sense he is still with us,” said Rehse. “The Department of Physics and Astronomy wanted to thank the Levys for the dinner they hosted so we presented them with a framed and autographed poster of Dr. Cornell. Now, Eric is a permanent resident in the Levy library,” smiled Rehse.

What do thermodynamics and biology have in common? They are both part of a new interdisciplinary program offered by the Wayne State University Department of Physics and Astronomy in collaboration with the Medical Physics Department.

As Michigan faces a shortage of research professionals in emerging technologies, the Department of Physics and Astronomy has stepped up to the plate and established itself as a national trendsetter with the 2008 implementation of a new undergraduate Biomedical Physics program. Seeing a need to provide a vehicle in which to address these shortages, the new program merges the disciplines of physics and biology, drawing from the expertise of the faculties of Biology, Medical Physics, and Physics.

“The Biomedical Physics program provides excellent preparation for undergraduates who will continue their education in careers like medicine, medical physics and pharmacy. Furthermore, students choosing graduate studies will have a solid foundation for physics, biophysics and biomedical engineering,” says Dr. Peter Hoffmann, Director of the new program.

The program emphasizes quantitative approaches to biology and medicine. Special attention is paid to applications of physics in medicine. Hands-on learning, in the form of laboratory courses and a

mandatory research component, are part of the discipline.

“Students completing our program will be prepared to work in medical careers or as biomedical professionals for high-tech companies, slowing the flight of high-tech professionals from Michigan,” Hoffmann added.

Hoffmann’s enthusiasm and tenacity, instrumental to the development of the program, has paid off. Initial response to the program has been overwhelming with 30 newly declared Biomedical Physics majors. “We saw a need in the community, we addressed this need, and now we are off to a terrific start with this dynamic new program.”

Through the generosity of the Richard J. Barber Fund for Interdisciplinary Research, the Department of Physics and Astronomy has awarded 17 scholarships to deserving Biomedical Physics majors.

Visit the WSU Physics and Astronomy website for Biomedical Physics program details and brochure.

## Cultural Exchange Possible Through Generosity of Warchol Family *continued from page 5*

and characterization of thin films. He has a number of synthesis facilities that are not available at Wayne State. Our students will participate in research collaborations in the area of novel thin film oxide materials and learn new techniques for preparing samples. "But, in addition to the research," Lawes

said, "it is beneficial for our students to be introduced to Indian culture as India is a central player in the developing global economy."

The collaborative projects started during the cultural exchange will not end in January, but will continue. WSU plans to

host an Indian graduate student from IIT Madras during the summer of 2009, and as Lawes said, "we expect to keep UPS busy by continuing to exchange samples with our Indian collaborators. ■

**Professors:** R. Bellwied, Mainz (Germany); J.J. Chang, Rutgers; D.A. Cinabro, Wisconsin-Madison; T.M. Cormier, MIT; P.E. Karchin, Cornell; W.E. Kauppila, Pittsburgh; P.H. Keyes, Maryland; P.K. Kuo, Minnesota; C.G. Morgan, Princeton; R. Naik, West Virginia (Chair); C.A. Pruneau, Laval (Canada); W.B. Rolnick, Columbia; A.M. Saperstein, Yale; R.L. Thomas, Brown (Dean, College of Liberal Arts and Sciences); S.A. Voloshin, Moscow Engineering Physics Institute (Russia); J.M. Wadehra, NYU (Associate Chair).

**Associate Professors:** G. Bonvicini, Bologna (Italy); D. Bowen, Pennsylvania; S. Gavin, Illinois; R.F. Harr, California-Berkeley; P.M. Hoffmann, John Hopkins; A. Mukhopadhyay, Kansas State; B.E. Nadgorny, SUNY Stony Brook; K.R. Padmanabhan, Poona (India); A. Petrov, Massachusetts-Amherst.

**Assistant Professors:** Z.F. Huang, Tsinghua (China); G. Lawes, Cornell; M. Mattson, Carnegie Mellon; S. Rehse, Colorado State; Z. Zhou, Florida State.

**Senior Lecturers:** J. Conn, Wayne State; P. Talagala, Wayne State.

**Adjunct Professors:** G.W. Auner, Wayne State; I. Avrutsky, Moscow (Russia); E. Buc, Wayne State; X. Han, Wayne State; V. Naik, Michigan; P. Vaishnav, Jodhpur (India).

**Emeritus Professors:** W.P. Beres, MIT; H.V. Bohm, Brown; J.T. Chen, Waterloo; H.H. Denman, Cincinnati; G.L. Dunifer, California-San Diego; L.D. Favro, Harvard; D.M. Fradkin, Iowa State; S.N. Gupta, Cambridge; Y.W. Kim, Brown; T.S. Stein, Brandeis; M.G. Stewart, Michigan.

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