This is the third year that I have the distinct pleasure of presenting to you the UIC Physics Department Newsletter which gets longer with every year. This is an especially dense issue which reflects how eventful and productive life is in our department. I hope that you'll want to take a look at the stories and the photos to see some of the recent successes of our faculty, students, and alumni. Since the last newsletter, the department has boosted its funding and taken important steps in new research directions. We are extremely proud of our students, alumni, and faculty for receiving numerous recognitions and awards this year. We have tried to describe all of these successes and capture all of the enthusiasm in the accompanying articles, which also provide news about our alumni and friends.

Sadly this year, we lost two dear colleagues who will be remembered and missed.

Professor Inder P. Batra was killed on July 24, 2007, together with his wife Uma, in a tragic road accident. Inder came to the university as head of the Physics Department in 1998 and served in that post for six years before joining the ranks of full professors. He gained respect and recognition for setting up new directions in the department and he took pride in the changes which occurred during his tenure as head. Inder believed strongly in the crucial role of science in society. He donated his personal funds to start a scholarship to be awarded each semester to a student who scores top grades in Phys 141. This award, now renamed to the "Inder P. and Uma Batra Memorial Physics Undergraduate Award," will continue to make a great difference in many students' lives.

In January, the Department lost a truly legendary figure with the passing of Professor Emeritus James S. Kouvel. Jim spent 38 years at UIC, beginning in 1969 when the physics department was still maturing and developing after the campus moved from Navy Pier to the new Chicago Circle location. Jim was largely responsible for the department's growth in quality and reputation, and consequently for what department is today. His philanthropic assistance included the establishment of a fellowship in physics for outstanding physics graduate students. Jim would have been pleased to know that the Department has distinctly chosen to honor his memory and his outstanding research achievements in the field of magnetism by establishing The Distinguished UIC Physics Department James S. Kouvel Lecture Series. Featuring a physics scholar of international distinction, it will play an important role in the academic life of the UIC campus, providing faculty, students and the public with tremendous insight into stimulating innovations in research and education. We hope that you will support this wonderful and fitting tribute to a man who has given so much to UIC and the Department of Physics. There is currently a holding account established at the University of Illinois Foundation in James Kouvel's name, and if you are interested in supporting this worthwhile endeavor, please send donations either directly to the Foundation (be sure you clearly indicate that it is earmarked for James Kouvel Lecture Series fund) or to the Department and we will deposit it in the Foundation account.

We will also miss Doris Bodmer, wife of Prof. Emeritus Arnold Bodmer, and John Pappademos, Prof. Emeritus, who also passed away in 2007.

I hope that as an alumnus or friend of UIC physics you will keep in touch with us. We love to hear from you. Alumni support is important to maintain our department's rich program of innovative research and quality education. I want to thank everyone who has provided financial support during the past year. Your generosity has been truly gratifying. The Physics Department needs your continued assistance to help the department continue its fine tradition of excellence in research and teaching.

---

**INSIDE THIS ISSUE**

**Undergraduate Research News**
- Focus on Teaching
- Faculty News
  - Awards and Promotions
  - An Innovative Role Model
  - Bettsfest
- Research News
  - Closing in on a Gamma Ray Laser
  - MPL tackles Energy Crisis

**In Memoriam**
- Inder and Uma Batra
- James Kouvel
- Doris Bodmer
- John Pappademos

**Giving at UIC Physics**

**Graduate Student News**
- Profile: Jerald Kavich
- Theses
- Awards

**Alumni News**
- Profile: Gustavo Otero y Garzon
- Alumni Updates

**Student News**

---

http://physicsweb.phy.uic.edu
It takes considerable funding to do cutting-edge research in physics, often called the "fundamental science." Efforts by faculty and staff in the first half of 2007 succeeded in securing access to nearly $11 million in research grants and scholarships for use mostly over the next three-to-five years.

This extraordinary success in attracting funding is the result of creative and energetic efforts to pursue new, as well as traditional sources of funding. The department's ability to secure the funding rests on its reputation for high quality research and serves as a benchmark of research productivity.

Some of the physics department's fundraising efforts include:

• A $3.9 million grant from the National Science Foundation to Professor Juan Carlos Campuzano, to study the behavior of electrons deep inside metals using an X-ray tool called the Advanced Photon Source at the Argonne National Laboratory. The study will be the only one of its kind in the United States.

• A five-year $920,000 NSF grant to Professor Anjum Ansari to advance studies of how proteins recognize specific binding sites on DNA during gene regulation.

• Grants of $1.3 million from the NSF and $1.7 million from the Department of Defense to UIC's High Energy Particle Physics group and High Energy Nuclear Physics group to conduct research at Switzerland's CERN Large Hadron Collider. The particle physics group includes physics Professors Mark Adams, Cecilia Gerber and Nikos Varelas. The nuclear physics group includes Professors Olga Barannikova, Russell Betts and David Hofman. Both groups include leading members of CERN's Compact Muon Solenoid experiment, which holds great potential to answer some of today's most fundamental questions in particle and nuclear physics.

• A $440,000 grant renewal from the Department of Energy to Professor Mikhail Stephanov, to expand and deepen the understanding of strongly interacting matter under extreme conditions of high energy and matter density, comparable to conditions during the early period of our universe.

• A $2.5 million NSF Partnerships for International Research grant to be shared by Professor Cecilia Gerber and colleagues at four other U.S. universities to collaborate with Swiss researchers at CERN to perform research, development, fabrication and testing for the next generation of silicon pixel particle detectors to be used at the Large Hadron Collider. The grant will also assist graduate students in their research work.

• $500,000 in grants from the Department of Education's Graduate Assistance in Areas of National Need program (GAANN), along with funding from UIC scholarship sources, to establish five graduate fellowships for U.S. citizens or permanent residents to enter advanced degree programs in the applied physics research areas of biophysics, optical and laser physics and infrared semiconductor physics. (see announcement on page 21).

• An anticipated contract with Sunovia Energy Technologies, Inc. would fund the MicroPhysics Laboratory's research in the area of solar energy (see story pg 10).

• An anticipated grant from BAE Systems to support research toward the development of a gamma ray laser (see story page 8).

Adapted from an article by Paul Franchuch originally published in UIC News July 2007
Opportunities for undergraduates include the Sivananthan Undergraduate Research Fellowship (SURF), a summer internship aimed at encouraging undergraduate participation in research labs.

Brian Tapia on SURF 2007

“When I applied...I had preconceived notions about the field of semi conductors and had not put much emphasis on its technological impact. However, two months later I’ve gained an insight and interest in the field I never thought I would have. It is all the more reason to advocate an emphasis in undergraduate research opportunities during the academic years prior to entering industry, R&D or graduate school. Coursework can teach the theory but can often leave out the hands-on experience that highlights the theory in action. The additional bonus to research participation is discovering if a particular physics sub-field is a direction to pursue.”

Marty Andrews on SURF 2007

“This summer I was fortunate to have the opportunity to continue my research with Professor Olga Barannikova. During the spring semester of 2007 I began working on the task of simulating the heavy-ion collisions which take place in the RHIC Time Projection Chamber at BNL. Using Monte Carlo simulations we were able to make conjectures regarding the causes behind the energy loss that takes place in these collisions. The knowledge I gained from this work allowed me to advance my investigation of this phenomenon by migrating from simulations to the analysis of actual accelerator data...I have had a thoroughly enriching experience working with Professor Barannikova and the STAR collaboration.”

Professor Robert Klie has successfully launched the new Journal of Undergraduate Research at University of Illinois at Chicago. The first edition of this journal was published in December of 2007, and contained scientific papers reporting the results of the Research Experience for Undergraduates (REU) program held over the Summer Semester 2007 at the College of Engineering at UIC. The mission of the Journal is to publish outstanding scholarship of undergraduates in the areas of pure & applied sciences, mathematics, and engineering at the University of Illinois at Chicago, and to showcase the work of the University Scholars. Future contributors will include winners of the new UIContest Internships (pg 24). The papers published in this journal are original work performed by the authors and are reviewed for scientific value by faculty members at UIC. The online journal and guidelines for submission may be found at http://physicsweb.phy.uic.edu/~jur/
FOCUS ON TEACHING

SILVER CIRCLE Awardee Knows Physics Isn’t Easy

David Hofman: He’s wanted to teach since “I had a teacher who inspired me.”

To understand physics, says David Hofman, you have to visualize it. “Even if it’s just bringing in your laptop and having some video examples of physics problems, this connects in a way that students can remember,” explains Professor Hofman.

“It’s important because it connects with the real world — not just some theoretical thing on the board. If you have to throw balls across the room, or whatever, it makes it come alive and gets their interest.”

Professor Hofman, who specializes in high energy physics, conducts research at top laboratories such as Brookhaven and Fermilab. “We collide large nuclei at near the speed of light to recreate the conditions of the early universe in the laboratory,” he says. “By doing this we are able to melt normal nuclear matter — the protons and neutrons — into a plasma of quarks and gluons in order to study, and better understand, the strong force.”

Professor Hofman, who also received a Teaching Recognition Award this year, began his career as a researcher at the Argonne National Laboratory, but “I’ve had the desire to teach since way back in college when I had a teacher who inspired me,” he says. “From then on, I felt I wanted to teach and impart to the next generation some of the excitement that I felt, sitting there learning about mechanics and how things worked.”

His high school physics instruction was minimal, so he didn’t appreciate the beauty and intellectual challenge of the field until he entered college. It wasn’t easy, and he keeps this in mind when teaching introductory courses to undergraduates. “I really didn’t know much. That enables me, in some way, to understand where the problems are,” he says.

“By approaching it from the perspective of what are the students NOT understanding, by asking questions and remembering what I didn’t understand — perhaps this enables me to explain things in a way that makes more sense and connects with them.”

Adapted from an article by Paul Francuch
Originally published in UIC News 5/2/07
Photo: Roberta Dupuis-Devlin

Winners of the Silver Circle Awards for Teaching Excellence are selected each year by graduating seniors.

http://physicsweb.phy.uic.edu
**FACULTY NEWS**

**PROFILE:** Juan Carlos Campuzano

![Image](image-url)

**LATEST DISTINGUISHED PROFESSOR A SUPER ATOMIC PHYSICIST**

It has been a year full of recognition for Professor Campuzano. He was honored by an Outstanding Technical Achievement award joining a group of other 2007 HENAAC Award Winners in Engineering and Science. HENAAC ([http://www.henaac.org](http://www.henaac.org)) was established in 1989 as a means of identifying, honoring, and documenting the contributions of outstanding Hispanic American science, engineering, technology, and math professionals. Earlier the same year he was promoted to the position of Argonne Distinguished Fellow. Most recently, he accepted the position of Director of the Under-represented Faculty Mentoring Program (UFMP) run by the Provost’s office. He now looks forward to drawing on a rich experience of his outstanding career at UIC to enhance academic opportunities of faculty in the UFMP program. For his contributions to science, Professor Campuzano, also a University Scholar, can now add UIC Distinguished Professor to his list of honors.

Top physicists around the world pretty much agree that when it comes to delving into the atomic-level workings of a special class of superconducting ceramic materials, nobody tops Juan Carlos Campuzano.

“One of the pioneers in the application of angle-resolved photoemission spectroscopy,” Bernard Keimer, a professor and director at Germany’s Max-Planck-Institut, wrote in support of his nomination.

“He has become a world leader in photoemission studies,” wrote Sunil Sinha, professor of physics at University of California, San Diego.

“Internationally renowned for his work,” wrote Peter Littlewood, professor and head of physics at Cambridge University and its respected Cavendish Laboratory.

What does Professor Campuzano study?

Hard, brittle non-metallic material called cuprates, which are copper-oxide ceramics. They act as superconductors—material that allows electricity to flow with virtually no resistance. So far, most other known superconductors are metals, and only exhibit superconducting properties when cooled down to extremely low temperatures.

“The theory of superconductivity is that you can send electrons through material without any resistance. Electrons pair up—which they don’t normally do; they usually repel strongly. They have to overcome this, form pairs and work together as a fluid,” he explained. “What we do with angle-resolved photoemission is send in...”
Professor Campuzano said they’re already being used and tested in devices such as MRIs, cell phone towers and even as transmission lines.

But scientists know very little about how cuprates work, or what they need to know to build electrical devices that meet exact and demanding industrial standards. Professor Campuzano may be among the first to answer these questions. He’s the lead investigator of a team of scientists from Urbana-Champaign, the University of Michigan and the Argonne National Laboratory to develop an instrument called a beamline for soft X-ray photoemission and scattering, an $8 million, four-year project funded jointly by the National Science Foundation and the U.S. Department of Energy.

“It will let us see what electrons are doing deep inside of materials,” he said.

Unlike his previous device, which used ultraviolet light to look at surface activity of electrons, then draw conclusions about activity deeper down, the new equipment should provide a clearer picture of what’s happening with electrons down deep. That may help unlock the secrets to how cuprates work.

UIC will build the device, which will be used at Argonne. Professor Campuzano’s lab has already built a prototype and he is confident the new instrument will be up and running within the next four years. “We don’t want to wait long. We want to use it before we retire,” he laughed, “Having and using such fancy toys is part of the fun of science.”
CLOSING IN ON A GAMMA-RAY LASER

Old Dream
Gamma rays are quanta of light with very short wavelength and extremely high energies. A coherent, high-brightness gamma-ray laser has been a dream of generations of scientists since the pioneering invention of the laser in 1960.

The lower energy X-ray laser was in itself extremely difficult to achieve because of the enormous power density needed to bring about a population inversion in which atoms in the laser medium reside in excited states long enough in time and high enough in energy density to enable amplification.

A solution to this basic problem was found in the 90's, when Professor Charles Rhodes' lab got around it by using light from an ultraviolet laser to excite clusters of xenon atoms (Xe) instead of single atoms. They were able to show that this procedure is remarkably suitable for producing and amplifying X-rays in the region of wavelength ~3 Å, a dimension shorter than the base-pair spacing in DNA.

This x-ray laser can facilitate microscopy with much better spatial resolution than conventional light microscopy, since the x-ray wavelength is so small.

Consequently, the x-ray laser became Professor Rhodes' eyes as his MicroImaging Laboratory develops important new high-resolution imaging techniques for biological micro-imaging. These imaging techniques could produce three-dimensional holographic images of hydrated human cancer stem cells at molecular resolution.

A new mechanism called Photon-Staging is presently being evaluated for the production of radiation and reactions in the MeV energy region. This step is facilitated by a further dramatic compression of power of approximately one billion-fold over that used in the x-ray case. This puts them on the verge of obtaining amplification in the gamma-ray spectral region, the next giant step in making coherent short wavelength radiation.

Filling a significant need
Gamma-rays are the most energetic form of electromagnetic waves, at least 10 times more energetic than x-ray photons. A coherently amplified gamma-ray beam will possess properties ensuring an enormous impact on many fields, including biology and medicine.

Because of the very short wavelength, far less than the size of an atom, the availability of coherent gamma-rays will set the stage for an exciting period of discovery that can be expected to revolutionize micro-imaging and many measurement technologies.

The exceptionally high penetrating power of a gamma-ray laser would allow it to reach deeply inside all forms of solid matter with intense coherent power and with precise control. High power and high precision are thereby put in solid alliance.

Novel techniques

Two recent developments, (1) the implementation of the Ultrabeam program on coherent x-ray generation and (2) the initial demonstration of the concept of Photon-Staging, together overcame the manifold technical difficulties previously inhibiting x-ray amplification and provide a solution and method for producing an ultra-bright multi-kilovolt coherent x-ray source. Figures 1-3 illustrate the essential pieces of this new method. Professor Rhodes' research efforts are now devoted to the use of the Photon-Staging mechanism of power compression for the production of amplification in the gamma-ray region.

The Ultrabeam program, sponsored by DARPA, involves the conversion of femtosecond duration ultraviolet laser pulses to X-rays, and the study of intense x-ray pulse propagation in various media. The goal of this project is the further development of x-ray lasers and the study of x-ray propagation in various media.

This project has achieved remarkable progress. Specifically, it has shown highly efficient extraction of high-power Xe(L) coherent ~4.5 keV X-rays from a spatially confined plasma channel obtained with 248 nanometer radiation in which a very high power density (~10^20 W/cm^3) is controllably produced. The upgrade of the Xe(L) x-ray laser into the multi-kilovolt spectral region cleared the path for a multitude of applications made possible by the ability to deliver extremely high coherent x-ray power in the attosecond range (1 attosecond is 10^{-18} s).

The goal for the Ultrabeam program is the channeling of 4.5 keV X-rays in solids with high atomic number Z in order to produce amplification in the gamma-ray range. Experience gained during the design and construction of the Xe(L) x-ray laser will prove invaluable when Rhodes' group will go on to scale physical mechanisms underlying the Xe(L) x-ray laser into the gamma-ray region (~100 keV to ~1 MeV).

The underlying scaling concept is the above-mentioned Photon-Staging. This concept enables the progressive scaling of the channeling mechanism at low frequencies (5 eV) to high frequencies (4.5 keV) at correspondingly higher plasma and power densities.

The chief predicted outcome of Photon-Staging is the generation of strongly enhanced ultrahigh power densities of ~10^{28} – 10^{29} W/cm^3, a range that can be reached with the corresponding channeled propagation of 2.9 Å Xe(L) X-rays in solids characterized by a high atomic number Z (e.g. uranium). This is the range required for amplification in the gamma-ray spectral region. Thus, the new physical mechanisms demonstrated by the Xe(L) system will undergo coherent amplification into the 100 keV-1MeV spectral region. Accordingly, for the first time, we can foresee implementing a technology capable of satisfying the needs for amplification in the gamma-ray regime.

written with help from Alex Borisov

Graphics courtesy of the MicroImaging Laboratory

\[ \delta_x \sim 15 \, \mu m \]


**MICROPHYSICS LABORATORY TACKLES ENERGY CRISIS**

**Background**

It is common knowledge that the United States' heavy dependence upon foreign oil threatens its economy and national security. In addition, there is growing concern about negative environmental impacts stemming from fossil fuel extraction and consumption. Solar power is an unlimited source of energy, yet solar electricity provided less than 0.1% of the world's energy usage in 2001. The sun's energy arrives on the surface Earth as light with energy spectrum ranging from about 3.5 eV (ultraviolet region) to 0.5 eV (infrared region). The energy of the visible region of light ranges from 3.0 eV (violet) to 1.8 eV (red); the maximum power of the sun is delivered in the yellow region of the visible part of spectrum, at about 2.5 eV. At high noon the solar power reaching surface of the Earth carries 1 kilowatt of power per square meter (1 kW/m²). The surface of the Earth receives more than sufficient solar power to meet human requirements by any stretch of the imagination. However a lot of innovative basic research needs to be done to ensure progress towards providing cheap and efficient ways of harvesting solar energy and meeting our compelling need for abundant and environmentally friendly sources of energy.

**Elementary Physics of Solar Cells: Light in, current out.**

In semiconductors, such as those used in solar cells, electrons have energies that are confined within certain energy bands separated by energy gaps between them (meaning that there are no energy states between bands). Electrons with highest energies are grouped within the so-called conduction band. The next lower energy band is called the valence band. The lowest energy level in the conduction band is separated from the highest energy level in the valence band by energy gap, also called the band gap. The band gap is the minimum threshold energy that needs to be acquired by an electron in order to be transferred from its valence band energy level to the higher conductance band energy level.

When the semiconductor in the solar cell is hit by photons of various wavelengths from the sun, these photons can pass through the semiconductor, be reflected by it, or be absorbed by it. When photons are absorbed and have a higher magnitude of energy than the energy gap value of the semiconductor, they may transfer their energy to electrons in the filled valence band and excite these electrons to higher energy states in the empty conduction band. When photons excite electrons across the band gap, they create negative charges in the conduction band and leave behind positive charges (called holes) in the valence band. Thus, absorbed photons in semi-conductors create electron-hole pairs in a semi-conductor.
A "p-n junction" solar cell consists of a sandwich structure formed between two types of semi-conductor materials; an n-type semi-conductor, that has mobile free negative electrons and a p-type semiconductor that has mobile free positive holes. If the n-type and p-type semiconductors consist of the same material it is a p-n homojunction and it is a p-n heterojunction if they consist of different materials. The junction structure allows the electrons and holes generated upon absorption of light to separate and move to opposite sides of the cell. The mechanism ensuring this is based on a charge gradient across the p-n junction which sets up an electric field that creates a barrier that prevents diffusion of electron and holes produced by light across the junction. The electrons created in the n-type semiconductor flow through an external wire connected to the cell towards the p-type side of the semiconductor, effectively creating a current and a voltage. The product of this current and voltage is equal to the electrical power generated by solar cell. The ratio of this power, divided by the total incident light power, defines the efficiency of converting solar power to electrical power by a cell. The efficiency of current solar cells needs to be increased and their costs reduced for solar power to increase its role as an important alternative energy source. Currently, the efficiency for commercially used generic silicon solar cells does not exceed 17%. One route to higher efficiency is through the use of thin film solar cells.

**Exploring the use of new materials: Zinc Oxide**

A promising direction for utilization of solar energy in a cost-effective manner appears to be provided by research in thin film solar cells initiated in Professor Sivananthan's Microphysics Laboratory (MPL). MPL is working on a useful strategy for reducing costs of producing solar cells by focusing on thin film solar cells that have a very high absorptivity for solar photons. Such materials are called direct-band-gap semiconductors. For the absorption of light the magnitude of the band gap is crucial. Wide gap semiconductors can be excited by ultraviolet light. Zinc oxide (ZnO) has a direct wide band gap of up to 3.3 eV at room temperature. An extra-wide band gap in the active layer of ZnO based p-n homojunction or heterojunction structures affects the transfer of high energy solar photons into electricity, and hence enhances the efficiency of the solar cell. ZnO is environmentally friendly and its importance for optoelectronic applications such as solar cells rests on its ability to be heavily n-type doped. By adding n-type dopants, the resistance of a zinc oxide film can be reduced to only several hundred Ohms, making ZnO one of the best materials for transparent electrode applications and p-n junction formation. Thanks to its excellent optical and electrical properties, light emitters based on ZnO are much more promising than current models based on gallium nitride.

A transparent conducting oxide (TCO) is an oxide that acts as the front contact to a device. It is needed to reduce the series resistance of the device. Transparent electronics is a growing technology, with TCOs being commonly utilized for a wide range of applications including window layers for thin film solar cells and flat panel displays. Recent years have seen increased

*con’t on pg 12*
Professor Edmundo Garcia-Solis has been with the High Energy Nuclear Physics group since fall of 2001 and has been an invaluable asset to the group’s research efforts in the time of its transition from PHOBOS to Solenoidal Tracker (STAR) experiments at Relativistic Heavy Ion Collider and to the CMS experiment at CERN. The Relativistic Heavy Ion Collider experiment aimed at reproducing conditions which existed one millionth of a second after the Big Bang at a temperature 40-thousands hotter than inside the Sun. Professor Garcia-Solis was responsible for the design, construction and commissioning of the trigger detector Zero Degree Calorimeter (ZDC) which detects neutrons that emerge from the gold-gold beam collisions within a 2 mrad (0.12°) cone about the beam direction, measures their energy, and is used to signal the occurrence of collision events of interest. These triggering detectors are of utmost importance for continued, reliable operation of an experiment. It is a measure of the quality and importance of his work that all four of the Relativistic Heavy Ion Collider experiments relied on the Zero Degree Calorimeter he designed to monitor luminosity and to determine the collision centrality on an event-by-event basis.

In addition to continuing his research with the UIC High Energy Nuclear Physics group, beginning in May 2008, Professor Garcia-Solis will also be working with the Bridge to the Doctorate (BD) Program, which is an NSF funded supplement to the Illinois Louis Stokes Alliance for Minority Participation (LSAMP). The main goal of LSAMP is to increase the number of individuals, particularly those from underrepresented minority groups, entering careers in the STEM disciplines in the US. He will be working towards developing innovative approaches in supporting the BD fellows. He will be the primary person responsible for scientific programming and support for the BD and will be expected to interact regularly with the BD fellows and effectively serve as a role model for aspiring scientists from underrepresented minority groups.

ZnO materials exhibit low resistance contacts to the junction and act as an anti-reflection coating for the active region. In addition, ZnO has low growth as well as deposition temperatures that ease fabrication procedures, and it can serve as a protective coating. To form a high performance ZnO p-n homojunction, the p-type doping of ZnO is first required. However, the growth of p-type ZnO material is difficult. MPL plans to co-dope ZnO with Al and N by means of sputtering or the molecular beam epitaxy (MBE) technique in order to produce high quality p-type ZnO films. The growth of n type ZnO with high conductivity, high transmivisity and high stability has already been established at MPL using either Al doping or Al-In co-doping.

interest in using ZnO for the production of TCOs because it is a lower cost material compared with the most currently used TCOs, mostly due to its abundance in nature. MPL is focusing its research on ZnO-TCOs and ZnO-based p-n junction in solar cells. The goal of MPL’s research is to reliably and reproducibly form ZnO p-n junctions, in either homojunction or heterojunction configuration, for solar cell applications and light emission, especially UV light emission. MPL is aiming at designing a highly conducting, transparent thin film that permits the transmission of solar radiation directly into the active region of a device with almost no reduction in amplitude or intensity.
On May 10, 2007, the Department, with support from LAS, commemorated the 60th birthday of R. Russell Betts, Vice Provost for Planning and Programs and Professor of Physics, with a day-long Symposium. Collaborators and friends planned in secret and surprised Professor Betts with the help of the planning committee: Olga Barannikova, Stephanie Chamberlin, David Hofman, Kay Miller and Kathy, his wife. After opening remarks from Provost Michael Tanner, participants were taken on a ride through the life of this scientist. David Pullen, his PhD supervisor, opened with a letter from collaborator Eric Cosmin and went on to talk about “Russell as a graduate student.” Ole Hansen of University of Copenhagen rounded out the program with entertaining stories of Professor Betts as a post doc at the Niels Bohr Institute. Then John Schiffer of ANL spoke on low-energy physics and molecular resonances followed by a very entertaining talk from Alan Wuosmaa of Western Michigan on “The APEX physics and Russell story.” At lunch Allison Donnelly (Russell and Kathy’s Daughter) played the violin. We then heard from Birger Back of ANL on E917 at the AGS and PHOBOS at RHIC. Ulrich Heinz of Ohio State led us through RHIC physics from the theory side, and Bolek Wysloch of MIT gave an overview of CMS Physics at the LHC. We were then joined by the rest of the Department for the end-of-year reception.

Dr. Betts’ research interests have been wide-ranging in the fields of Atomic, Nuclear and High Energy Physics. His work is well known in the study of cluster structure in atomic nuclei and he is the discoverer of several important phenomena in this field. As spokesman of the APEX experiment, he spearheaded the US efforts to resolve one of the most tantalizing problems of atomic and nuclear physics – the well-known “Positron Peak Problem.” Most recently he has led the UIC group in studies of high energy density QCD matter at Brookhaven National Laboratory’s Relativistic Heavy Ion Collider and at CERN’s Large Hadron Collider. He is co-author of over 200 articles and book chapters and has delivered more than 50 invited conference and symposium presentations at national and international meetings.

Besides playing an important role in energy production in high-efficiency solar cells, zinc oxide also shows great promise for being used in light-emitting diodes (LEDs). An LED produces light through the semi-conducting properties of its constituent materials. Unlike an incandescent light bulb, LED lights do not heat a filament to generate light. For this reason, LEDs are expected to replace low-efficiency incandescent and fluorescent lamps currently used for illumination and produce significant energy savings. Work on LEDs is part of the activities focused on developing energy-efficient lighting sources in a variety of applications, including automobile brake lights, traffic signals, exit signs, and flashlights. Also, LEDs require much shorter times to reach full brightness than incandescent bulbs, which is one reason for their wide adoption in the automobile industry for interior lights. ZnO materials have received much attention due to their superior properties, such as the high exciton binding energy of 60 meV at room temperature, which may lead to a strong light emission in the ultraviolet region. Therefore, ZnO could be the potential material for the next generation solid-state lighting devices. Researchers at MPL are exploring various approaches to growing zinc-oxide based LEDs. Their objective is to develop LED structures on inexpensive zinc-oxide materials having high internal efficiency and high light extraction efficiency.
On September 25, 2007, the UIC community came together to remember Inder and Uma Batra, who were killed in a tragic car accident in July. We were joined by their family and friends. It means something special to us that we had with us UIC Chancellor Sylvia Manning, Vice-Chancellor Gislason (now Interim Chancellor), Trustee Niranjan Shah, and LAS Dean Dwight McBride.

The entire UIC Physics Department extends its deepest sympathies to Inder and Uma's family. We hope that seeing our appreciation for Inder and Uma's dedication and their contribution to this community, seeing how much this tragedy has touched us all, and knowing how distinguished record of sustained scholarship spanning nearly three decades, and opportunity to work at the three top IBM Research laboratories (Almaden, Watson, and Zurich). He published more than 200 technical papers, including one in which he was a co-author with 1986 Nobel Prize winner Heinrich Rohrer. While at IBM he made numerous invaluable contributions in the areas of nanoscience, solid state physics, fluid dynamics and high-performance computing. Professor Batra edited several books and proceedings, and served as advisory editor for international journals. He was, since 1973, a Fellow of the American Physical Society.

Professor Batra was also a skilled and accomplished manager who could have remained in high-level managerial positions at IBM if not for his dream of influencing and inspiring the lives of young students. This dream brought him in 1998 to UIC, recruited as Head by then Dean of LAS and current Interim Chancellor Eric Gislason. Professor Batra served in that post for six years before joining the ranks of full professors. He gained respect and recognition for directing quality hires, successful promotions, an enhanced research profile, and increased grant and contract expenditures which essentially doubled during his tenure, growing from $3M to $5.5M, firmly placing the Department at the top position among other departments in LAS. He also started the modernization of our undergraduate physics lab, a very successful effort which continues to this day.

In research he worked in electronic, transport and structural calculations for metallic and atomic nanowires using density functional theory and other analytical methods.

In addition to his wide-ranging contributions to administration and research, Professor Batra gained fame for his innovative teaching methods and style. He created "Studython" for his Physics 244 students, a popular evening session of questions and answers before the final week. To help his students understand basic concepts of relativity, Professor Batra wrote a funny and poignant one-act scientific play for his Physics 244 students in which Einstein is put on trial for running a red light. This play was a hit with students and has been performed several times.
Professor Batra’s instructional reach extended far beyond the classroom and lecture setting. Not only did he capture the hearts and minds of students in his classes, but he also looked for any occasion to advise students, with eyes twinkling, on how to succeed in their future professional careers, utilizing his extensive technical management and executive experience in industry and academia. For a year, Professor Batra contributed a bi-weekly column to the student newspaper "UIC Today" entitled, "Message from the Head". These letters covered a broad range of topics of general interest written to inspire and enlighten students with words of encouragement and advice. They showcase his wit and caring and we are grateful to have these to remember him by.

Professor Batra believed strongly in the crucial role of science in society. He donated his personal funds to start the "Inder P. Batra Physics Undergraduate Award", to be awarded each semester to a student who scores top grades in Phys 141. This award, now renamed to the "Inder P. and Uma Batra Memorial Physics Undergraduate Award" will continue to make a great difference in many students' lives.

"Professor Batra is a very good teacher. I enjoyed having him for modern physics and he is always really helpful. Right before midterms and final exams, he would always give up some of his own time to have a review session. He encourages us to attend so that he may help us with whatever questions we might have."

—a Physics 244 student

We'll always remember what he did for us and countless students here at UIC.

The entire Department looked to Dr. Batra for leadership, balance, encouragement, and enjoyable conversation. Friends, colleagues and students looked to him for his wise advice and appreciated his loyalty. Staff members had very special relationship with Professor Batra encouraged by his generosity, caring nature and cheerfulness.

Professor Batra’s knowledge extended beyond physics and his students were enriched by stories of his life experiences and his views on many subjects, which he enthusiastically shared with them. He will be remembered as someone who made a great difference in so many students' lives and who helped a lot of people at UIC. This is his legacy that will not be forgotten. To quote from one of the comments made by his students in the end of semester evaluation: "Thanks so much Professor Batra 😊"

Contributions to the Inder P. and Uma Batra Memorial Physics Undergraduate Award may be made at http://physicsweb.phy.uic.edu/giving/

---

We want to hear from you!
Students, Faculty, Alumni and Friends:
Send us your comments, input, or remembrances of UIC Physics via email to physics@uic.edu
Your comments may be included in the next publication of the newsletter.

http://physicsweb.phy.uic.edu
James S Kouvel was born on May 23, 1926, in Jersey City, New Jersey. Combining his studies with service in the US Naval Reserve in the South Pacific from 1944 to 1946, he earned a bachelor’s degree in engineering and a PhD, both from Yale University, in 1946 and 1951 respectively. From 1951 to 1953 he was a research fellow at the University of Leeds in England where he met his future wife, Audrey Lumsden. Returning to the United States, James and Audrey taught and studied at Harvard from 1952-1956. From 1956 to 1969 James Kouvel was with the General Electric Research Laboratory in Schenectady, NY. Over the years James spent periods as Visiting Professor at the Universities of Paris and Amsterdam and the Atomic Energy Research Establishment at Harwell, England. He also was a consultant at Argonne National Laboratory (1969-1989).

Dr. Kouvel was a physicist for General Electric Company’s Research and Development Center from 1955 to 1969 before he joined the physics faculty at the University of Illinois at Chicago. A respected national figure in the study of magnetism, Professor Kouvel won the Guggenheim Fellowship (1967-68), was elected to a fellowship of the American Physical Society in 1962 and to a fellowship of the American Association for the Advancement of Science in 1983. He was a member of the editorial advisory board of the Journal of Magnetism and Magnetic Materials since 1975. He was involved in committees with the National Science Foundation and National Research Council. His more than 154 publications have received above 3600 quotations.

Joining the Department of Physics at UIC in 1969, he established a sustained and distinguished record of research, teaching, professional and administrative service. For many years he served as Director of Graduate Studies. He retired in the fall after a 38-year career at UIC. It is his dedication, hard work and many years of support that provided the foundation for the current high status of the UIC Physics Department. Many of the students Professor Kouvel mentored have distinguished themselves in many aspects of academic life. Dr. Harry Radousky who graduated with Professor Kouvel in 1982 has been a Deputy Director of the University Relations Program in the Lawrence Livermore National Laboratory since 1982.

Professor Kouvel’s many research contributions, which we will outline below, raised the visibility of the UIC Physics Department. He was one of the first persons to
says goodbye to friends and colleagues

identify exchange anisotropy as being responsible for the very interesting properties of certain transition-metal alloys and compounds. Today, these properties are used extensively in the magnetic recording industry. More significantly, later work on this topic by Gruen and Fert was instrumental for their receipt of this year’s Nobel Prize. Another milestone in Professor Kouvel’s career was the discovery of “giant magnetic moments” in NiCu alloys. Until the time of this discovery the magnetic properties of alloys were understood in terms of the rigid band model, which predicted a spatially uniform magnetization density. Professor Kouvel and his co-workers showed that this is not at all the case. Their neutron scattering results demonstrated that the magnetization density is very non-uniform and concentrated in so-called magnetic clusters or giant magnetic moments. This discovery started a flurry of activities involving many scientists world-wide, and eventually led to a complete change in our understanding of magnetic properties of Alloys.

Professor Kouvel also contributed extensively in our understanding of magnetic phase transitions. Together with M. Fisher he developed a novel way of analyzing the critical behavior near a ferromagnetic phase transition. This led to a better understanding of the scaling behavior of the magnetization near the transition. These new presentations are referred to in the literature as Arrot-Kouvel plots. His seminal 1964 paper with M. Fisher, which helped to establish an influential method of analysis of critical phenomena, has received more than 400 citations.

Later in his career, Professor Kouvel did significant work on a new class of materials, called Spin Glasses. With his students, he helped to elucidate the complex nature of the magnetic interactions in these materials. He developed a new experimental technique to investigate the anisotropy of the magnetic interaction by rotating the sample in a magnetic field and simultaneously measuring two components of the magnetization vector.

Professor Kouvel’s most recent research was on vortex pinning in superconductors. Vortex pinning is the classic property of a superconductor below its critical temperature. Its zero resistance to electric current is operational only if the magnetic filaments (known as vortices) produced by the current are prevented from moving. Hence, the strength with which the vortices are pinned inside the material is an important practical problem. His work led to new insight into the pinning mechanism based unconventional magnetic measurements on superconducting samples as they were rotated slowly in fixed magnetic fields. These rotational experiments have been carried out on the new high-Tc superconducting compounds and uncovered many unusual features of their vortex states.

A notable feature of Professor Kouvel’s support for the Physics Department was his philanthropic assistance which included the establishment of a fellowship in physics for outstanding physics graduate students. Continued on page 19

A UIC Physics alumnus on Jim Kouvel:

I learned from Dr. Kouvel the secret of doing research. I learned from him that we did not understand many things around us including how fridge magnets worked; thus Dr. Kouvel taught me the courage to jump into any area of research that interested me. I studied NiMn disordered alloy for my Ph.D. Degree with Dr. Kouvel, and now I am studying the danger of cell phones and some environmental studies. I published a paper with two medical doctors in a health related journal. It is exciting for me to be able to contribute to studies related to our health and I thank Dr. Kouvel for that; the courage and the knowledge he gave me were very helpful.

I am now a full professor at West Virginia University and I met many researchers during my 20 years tenure. I found that there were only very few researchers and professors like Dr. Kouvel in their honesty and research capabilities. Professor Kouvel said once to me that he would never retire; I was surprised that he did.

Wathiq Abdul-Razzaq, UIC alumnus, PhD 1986
Professor of Physics and Director, Introductory Physics Curriculum
West Virginia University Department of Physics
In May we lost Doris Bodmer, wife of Professor Emeritus Arnold Bodmer, to cancer.

Mrs. Bodmer was born Doris Zerbe in 1931. At the age of 4, her family decided to leave Germany for neutral Switzerland. Her skating awards include the Swiss Ladies National Championship for figure skating in 1953. The next year she moved to London because they had year-round rinks where she could practice. It was there she met Arnold Bodmer, a new doctoral graduate in nuclear physics, who had been born in the same Frankfort hospital as she had been. They were married in 1956 and moved to Manchester, England, where they started their family and she continued to teach skating. In 1965, Professor Bodmer took a joint position at UIC and Argonne National Laboratory which brought the family to the Chicagoland area.

Mrs. Bodmer, who was fluent in six languages, got her undergraduate degree at Roosevelt University and a master's degree in German literature from the University of Chicago. For more than 30 years she taught new generations of young skaters in the suburbs. She was also a judge and consultant for the United States Figure Skating Association and the author of the book How to Raise a Competitive Figure Skater (2002, Mehler Press). She was one of the founders of the DuPage Figure Skating Club.

In keeping with her multi-national background the Arnold R and Doris G Bodmer Science Travel Award underscores the importance of students widening their horizons and experiencing other cultures. It provides upper-level undergraduate and graduate science students at UIC with the resources to travel abroad for study, seminars, or workshops.

Dr. John N. Pappademos passed away on May 5, 2007 in St. Louis, Missouri. He was 82. He started as Assistant Physics Professor at U of I campus at Navy Pier in 1957 and continued his work in our Department until his retirement in 1990. In addition to pursuing his scientific interests in hyperon-nucleon interactions, he often engaged in debates on political and social issues. He was active in the fight against the Vietnam War, serving as the national chair of Scientists Against the Vietnam War. From 1988-2001, he was a referee for the American Journal of Physics.

Professor Pappademos enrolled at Harris Teachers College at the age of 16. From there, he went to the University of Iowa, which he attended while serving in the Naval Reserve. He received his MS in 1951 from Washington University, where he participated in a campus desegregation campaign, and in 1964, he received his PhD in physics from the University of Chicago. One of his areas of scholarly interest was the African origins of math and science. His paper, “An Outline of Africa’s Role in the History of Physics,” was published in Ivan Van Sertima’s seminal anthology, “Blacks in Science: Ancient and Modern.” He was also a contributor to the Journal of African Civilizations.

His funeral was held on May 21, 2007 in St. Louis. He is survived by his wife, two daughters, three grandchildren, and many friends.
"I see Professor James Kouvel as my role model for an excellent teacher. It was his course that first drew my attention to the problem of superconductivity."

Adam Kaminski, UIC alumnus, PhD 2001
Assistant Professor Department of Physics and Astronomy, Iowa State University
Associate Scientist at the U.S. Department of Energy’s Ames Laboratory

He and his wife, Audrey L. Lumsden-Kouvel, a fellow faculty member at UIC, have generously supported the University, especially through the James Kouvel Graduate Fellowship in Physics and the Audrey Lumsden-Kouvel Graduate Fellowship in the Department of Spanish, French, Italian and Portuguese.

The physics department will inaugurate The Distinguished UIC Physics Department James S. Kouvel Lecture Series in 2009. Donations in support of the series may be made to the University of Illinois Foundation Attn: James Kouvel Lecture Series.

PHD THESES OF 2007 PHYSICS GRADUATES

PBSNSE(211)/CDTE(211)B/SI(211) Interfaces
Chad Fulk (2007) Advisor: Professor Sivalingam Sivananthan

Angle Resolved Photoemission Spectroscopy study of High Temperature Superconductors
Utpal Chatterjee (2007) Advisor: Professor Juan-Carlos Campuzano

Probing Superconductors Via Impurities

Studies of the Surface Growth and Point Defects Using Density Functional Theory
Anthony Ciani (2007) Advisor: Professor Serdar Ogut

Optimization of the Hg1-XCdXTe Surface and its Characterization by Electrical and Optical Techniques
Rajni Kiran (2007) Advisor: Professor Sivalingam Sivananthan
PHD STUDENT WINS INTERNATIONAL FELLOWSHIP

Recently, I was very fortunate to be awarded a fellowship from Forschungszentrum Jülich in Germany. This fellowship is part of a unique research program jointly sponsored by Argonne National Laboratory‡ and Forschungszentrum Jülich‡. This program already goes back to the late 1970s and is nowadays designed to give graduate students the opportunity to perform research abroad, while at the same time building international contacts and promoting inter-laboratory relations. The exchange program is open to students in the field of physics from Argonne and Jülich who are typically within a year or two of graduation. Due to this program, for example, Prof. Peter Grünberg from Jülich spent some time in the 1980s at Argonne performing the early steps of the research that led to the Nobel Prize in Physics in 2007.

As a graduate student in the UIC Department of Physics, my thesis research has been co-sponsored by the Magnetic Materials Group at the Advanced Photon Source at Argonne National Laboratory. I have concentrated my efforts on circularly polarized soft x-ray resonant studies of ferromagnetic oxide materials. I have also contributed to the development of soft x-ray resonant scattering techniques at the Advanced Photon Source to specifically probe interface magnetization in buried interfaces. However, I was also interested in the computational methods which have been developed to describe the electronic and magnetic structure of strongly correlated electron systems such as transition metal oxides.

At Forschungszentrum Jülich, my research was supervised by Prof. Dr. Stefan Blügel, Director of IFF Theorie 1. His group is a well respected team of highly experienced researchers and talented students pushing the limits of multiple computational techniques. The laboratory itself has some of the most advanced computing capabilities in the world. My three months at Jülich was spent implementing the FLEUR code to calculate the electronic structure of magnetic transition metal oxides. The FLEUR code is a state-of-the-art density functional theory based ab initio technique exploiting the FLAPW or full potential linearized augmented plane wave method. The method is very well suited to a study of magnetic thin films with direct applications to x-ray absorption spectroscopy and magnetic circular dichroism. In the case of theoretical computations, the methods are quite advanced and require a wide background of skills. The opportunity to work with such a well established laboratory and have direct contact with the researchers who continually develop the techniques has obvious advantages. With this support, I was able to apply this technique to interesting systems relevant to my thesis work as well as open the opportunity for a future international collaboration.

Modern scientific efforts demand a multidisciplinary approach to the solution of problems. Oftentimes in physics, fields advance extremely rapidly and the gap between novice and expert constantly increases. In these situations of rapid advancement, a program like this has the ability to contribute a great deal. I strongly encourage graduate students to seek out opportunities like this because they are a benefit to everyone. I left Jülich with, not only a greater appreciation for theoretical physics and modern computational methods but also an even greater respect for international scientists in the U.S. who have to learn a new culture.
GAANN FELLOWSHIPS
APPLIED PHYSICS

The University of Illinois at Chicago (UIC) Department of Physics invites applications for GAANN doctoral fellowships for full-time study in Applied Physics. Applications will be considered for Spring and Fall 2008.

The GAANN Ph.D. Fellowships in Applied Physics

The fellowships are funded by a grant from the U.S. Department of Education's Graduate Assistance in Areas of National Need (GAANN) Program. The UIC Department of Physics GAANN Program aims on recruiting talented US citizens and permanent residents with an excellent academic record and strong motivation to pursue a doctoral degree in the area of Applied Physics. GAANN Fellows receive a stipend based on calculated financial need up to a maximum of $30,000 per year. They will also receive a tuition and fee waiver. Additional funds are available to cover the cost of tuition, fees, books, computer hardware and software, travel to technical conferences, and other research needs.

Research Topics

GAANN Fellows will conduct research in state-of-the-art research laboratories of the Microphysics Laboratory (MPL) studying the growth by molecular beam epitaxy and characterization of infrared semiconductors (Drs. Sivananthan and Grein), the Laboratory for Atomic, Molecular, and Radiation Physics housing the world's biggest and brightest ultraviolet laser system (Dr. Rhodes), the optical and laser physics laboratory of Dr. Schroeder and the Biophysics laboratory of Dr. Ansari conducting research on the dynamics of biological macromolecules with time-resolved fluorescence spectroscopy.

Application Process

Fellowships will be offered to the highest-ranking applicants who are U.S. citizens, nationals, or permanent residents. Interested candidates should submit an application for graduate school at UIC for the Physics program and complete a Free Application for Federal Student Aid (FAFSA). Online applications are available at http://www.uic.edu/depts/ear/applyonline/grad/
The FAFSA can be completed online at http://www.fafsa.ed.gov.

Applicants are encouraged to contact the UIC GAANN Fellowship Program coordinator Yasmin Anter (yanter1@uic.edu) for additional information and to start the application process. Visit http://www.phy.uic.edu for additional information about UIC GAANN fellowships and http://physicsweb.phy.uic.edu/graduate/gradappprod.asp for description of application procedures.

Applications by students from traditionally underrepresented groups in science and engineering are strongly encouraged.

and a new way of life in addition to the daily challenges presented by science. This opportunity has also prepared me for my next position as a post-doctoral researcher in the Institut Català de Nanotecnologia at the Universitat Autònoma de Barcelona which begins May 1st. I would like to thank both Argonne and Jülich for this truly enriching experience.

†http://www.anl.gov/
‡http://www.fz-juelich.de/portal/

More information on Graduate Fellowship Opportunities, including GAANN, may be found on our website at

http://physicsweb.phy.uic.edu/graduate/scholarships.asp

http://physicsweb.phy.uic.edu
I joined UIC in the fall of 2001 and after four and a half years of hard work I finally obtained my desired Ph.D. From the very beginning I had the chance to work within the High Energy Physics (HEP) group under the guidance of Professor Dr. Cecilia Gerber to whom I will always be indebted.

The UIC HEP group is part of the DØ Collaboration at Fermilab where more than 500 physicists from 80 institutions in 20 countries study fundamental physics at the energy frontier. It was a great pleasure working at such an experiment where I got a balanced education in a variety of topics such as cutting edge detector technology, a plethora of ways to carry on an analysis, a lot of computing knowledge and collaborating in a huge effort to understand the physics of fundamental particles at the highest energies.

My thesis dealt with the measurement of the top quark pair production cross section, one of the most important quantities in a sector that has a very short lifetime (the top quark is one of the latest fundamental particles, discovered in 1995 at Fermilab). At the time of publication, this was the most precise measurement of this quantity and the thesis received the Thesis Award from the UIC Graduate College.

After graduating I worked for a year as a postdoctoral fellow with the same group and the same experiment but pursuing different goals. During that year I led the configuration of DØ’s trigger system, a complicated and powerful system that selects the interesting physics events to be recorded by the experiment (100 out of
almost 2 million events per second) for the full physics program at DØ. I also made use of my experience with production of top quarks via the strong force and started working towards the discovery of electroweak production of top quarks. In August 2007, I accepted a postdoctoral position at the Fermi National Accelerator Laboratory to continue my work at DØ and to join the effort at the Large Hadron Collider at CERN.

The degree of excellence of the Physics Program at UIC provided me with a chance to fulfill the necessary academic achievements and helped to give me access to the most important and competitive of places where physics can be enjoyed. I will always remember with joy my years as a UIC student.

**James Rabchuk**
PhD, 1995, Richard Carhart, Advisor, has been at Western Illinois University since 1996, where he has recently been promoted to full professor status, starting in the fall of 2007. He engages undergraduates in his research in the areas of Atomic Ion Traps and applications to Quantum Information processing.

**Harry Radousky**
PhD, 1982, James Kouvel, Advisor, is Lawrence Livermore National Laboratory Recruiting Programs Division Leader and UC-Davis Adjunct Professor of Physics.

**Vasundara "Vasu" Varadan**
MS, 1970, PhD, 1974, David J. Vezzetti (UIC Professor 1965-1980), advisor. Dr. Varadan served as Distinguished Professor of Engineering Science & Electrical Engineering at the Pennsylvania State University for 22 years. In 2005, Dr. Varadan left PSU to join the University of Arkansas as the George and Boyce Billingsley Chair and Distinguished Professor of Electrical Engineering. Dr. Varadan developed the first wireless remotely activated sensor and has applied it to aircraft ice sensing and de-icing techniques. She co-founded HVS technologies, Inc. and has obtained recognition for providing innovative microwave measurement solutions. More recently, she has focused on Smart Materials, Adaptive or Intelligent Systems and Wireless Sensors. Her research has included closed loop numerical modeling of adaptive systems incorporating a full three dimensional finite element smart system model, robust control theory, uncertainty modeling, and the development of the first passive wireless SAW sensor. Dr. Varadan has worked on the emerging field of metamaterials providing experimental evidence of negative permittivity and permeability in engineered microwave composites.

**ALUMNI UPDATES**

**Wayne A. Ancher**
BS Physics, 1976, MS Physics '1977, of Huntington Beach, California, is a project specialist, Integrated Defense Systems, at the Boeing Company.

**John DeHaan**
BS Physics, 1969, of Vallejo, California, is the co-author of "Forensic Fire Scene Reconstruction" (Prentice Hall, 2003). The book brings together concepts to support scientific fire investigation and is companion text to "Kirk's Fire Investigation", DeHaan's textbook that is now in its fifth edition.
UICONTEST REBORN

The department is pleased to announce the New UIContest. Originally created as a trivia contest where local high school students competed for summer internships and scholarships, UIContest now targets undergraduate students interested in research. Up to three internships are made available each year for undergraduates seeking experience in physics research. The paid internships run from October – April under the supervision of UIC Physics faculty members. As a culmination of their efforts, students choose to participate in the UIC Research forum, held in April of each year, or to prepare a submission for the new Journal of Undergraduate Research. Interns are eligible for the regular awards granted at the UIC Research forum and for publication in the Journal. This year’s interns are highlighted in the box to the right.

Student: Michael Greco
PI: Andreas Schroeder
Research Topic: Development and characterization of a femtosecond thermal-lens-shaped Yb:KGd laser radiation source to be used in the development of an ultrafast electron microscope.
Goal: Participation in group’s publications.
Mike has 18 months research experience in Professor Schroeder’s lab and has a strong theoretical base in optics.

Student: Nick Spizzirri
PI: Mark Schlossman
Research Topic: Phase transitions in two-dimensional assemblies of surfactants at the interface between liquid water and liquid oil.
Goal: A poster on inhomogeneous phases in 2-dimensional systems.
Nick is a physics and mathematics major. This will be his first experience working in a lab.

Student: Martin Andrews
PI: Olga Barannikova
Research Topic: Study of energy loss mechanisms in ultra-relativistic heavy-ion collisions, Investigation of QCD jet quenching with di-jets using the 2+1 correlation.
Goal: A paper is in the works, targeted for PRL that encompasses Martin’s work.
Marty is a previous winner of the SURF (2007).

As part of the WISEST Visiting Scholar program, the Department welcomed Professor Susan Coppersmith (left), Chair of the University of Wisconsin Physics Department. Dr Coppersmith presented a scientific talk on “Quantum Computing Opportunities and Challenges,” and also gave a general talk entitled, “Things I Wish I Had Known About How to Succeed as a Physicist.” She has received some of the most prestigious awards in her field. In 1992, she was selected a Fellow of the American Physical Society (APS), one of the top honors in the field of physics. She was also awarded a fellowship from the American Association for the Advancement of Science in 1999. In 2006, Dr. Coppersmith was elected to the American Academy of Arts and Sciences (AAAS), a society composed of the worlds leading scientists, scholars, artists, business people and public leaders. The Department is proud to have had her as our first Visiting Scholar!

Presented in partnership with the Physics Department and WISEST sponsored by NSF ADVANCE Institutional Transformation Award

The Physics department is devoted to encouraging young physicists through the Women in Science and Engineering (WISE) programs. We believe that the best way to encourage young women to join the world of Science and Engineering is to provide them with strong role models. As part of this effort, departmental WISEST mentor Professor Olga Barannikova (right) holds WISE mentoring hours each week for our majors and graduate students. She also holds monthly sessions where students can get academic help and career guidance.
Rebecca Osborn joined the Physics Department staff in September of 2007 as the Graduate Program Advisor. Rebecca has personal experience as a graduate student. She has worked as a TA and a Graduate Instructor for the Anthropology Department here at UIC, and before that at Northern Illinois University, where she received her MA in Anthropology. Originally from Kansas, Rebecca worked as an archaeologist in such diverse places as Sicily and Peru. She can also identify any bit of human bone you could show her. In her spare time, Rebecca enjoys playing board games, taking advantage of all the fun things going on in Chicago, and painting with her fiancé.

Paola Caicedo joined the Physics Department in September of 2007 in the position of Research Grants Coordinator. Originally from Ecuador, Paola moved to the States to pursue her education and received an economics degree in 2004. She lived in California for several years before moving to Chicago in 2002. Paola started working for the University soon after her graduation in 2004; previously as a Project Coordinator in the Anatomy department, and now for Physics. When not working, Paola enjoys the outdoors, and passes the long Chicago winter reading and spending time with her husband.

Professor Dirk Morr and his wife Lis welcomed Maximilian Robert Elliott Morr on January 29th, 2008. Big sister Leni is excited too! Congratulations!

http://physicsweb.phy.uic.edu
GIVING AT UIC PHYSICS

MARK MUELLER AND TOM IMBO: FRIENDSHIP BENEFITS COLLEGE

Chicago native and UIC alumnus Tom Imbo, BA 1986, serves his alma mater as a Professor of Physics and enjoys a reputation for fostering an intense intellectual atmosphere for the study of numerous topics in theoretical physics, pure mathematics and the philosophy of science. He also has great taste in friends. While a fellow at Harvard University, he met and formed a close professional alliance with Mark Mueller (pictured left) who would become a successful entrepreneur in the financial industry and utilize his physics training to analyze financial markets. Since 2001, Mark has been a regular and substantial intellectual and financial contributor to the University, not only supporting Tom’s research at UIC but also serving as Adjunct Professor in the Department. In 2007 he accepted membership on the LAS Board of Visitors.

The Physics department thanks its friends and alumni who have generously given in the last year:

Wayne A. Ancher
Arnold R. and Doris E. Bodmer
Tak Cheung
John DeHaan
James S. Kouvel and Audrey L. Lumsden-Kouvel
Howard S. and Natalie L. Goldberg
Janis Hayden
Burt and Kyra Holzman
Rajeev and Sonia Kinra

Mark Mueller
William Orance
Harry B. Radousky
Arkalgud and Jyotika Ramaprasad
Robert and Debra Ross
Karen Sholeen
Sivalingam Sivananthan
Scott Stirton
Diana Lee Troxel
Vasundara Varadan

reprinted from LAS publications
We want to hear from you!

Add your news to this card and give us an update on your whereabouts. We’ll be happy to include your announcements in our next newsletter. Or upload your photo and find contact information for old friends at http://physicsweb.phy.uic.edu/people/physics_alumni_entry.asp

Visit us and add your information! We’re looking forward to hearing from you!

Donating is easy! By visiting http://physicsweb.phy.uic.edu/giving you may select your preferred fund and show your support for UIC Physics.

Your tax-deductible gift has an immediate impact on the experience of the students who are your successors in the department. Your contribution is key to our success in attracting top applicants to our programs and helps to support all the aspects of the best available education including:

• research opportunities
• teaching experience
• travel support

• cutting-edge teaching lab experiments
• colloquia and seminars

We have been fortunate to have the support of our alumni who regularly give back to the department where they received the foundation of their career. With your support, UIC Physics can continue to build on its tradition of excellence in teaching and research.

UIC Physics will inaugurate The Distinguished UIC Physics Department James S. Kouvel Lecture Series in 2009. You can help jump start this new fund by making your check out to the University of Illinois Foundation Attn: James Kouvel Lecture Series and mailing it to us at the address on the postcard.
About the Cover:
"Matter" by Artist Shari Imbo is one in a series of eight pieces commissioned by the Department of Physics.

http://www.shari-imbo-swartz.com

Editing and Layout by Stephanie Chamberlin and Henrik Aratyn

Contributors:
Martin Mitchell Andrews
Alex Borisov
Helmut Claus
Paul Francuch
Christoph Grein
Hans Goeckner
Melanie Kane
Jerald Kavich
Craig Lennon
Rebecca Osborn
Gustavo Otero y Garzon
Raymond Brian Tapia

With special thanks to Google for photo permission