Greetings,

It has been an eventful year in the Department of Physics, one that has included many successes and also brought some changes.

It was wonderful to be able to celebrate the research achievements of physics faculty that were recognized through honors and awards, starting with Cecilia Gerber who was named UIC 2011 Researcher of the Year for the Natural Sciences & Engineering for her leading role in the discovery of the single top quark production by the international D0 collaboration. Serdar Ogut was elected a 2011 Fellow of the American Physical Society, a distinct honor bestowed annually to only the top researchers in the field and limited to one-half of one percent of the membership. Dirk Morr was awarded both a Fellowship by the Alexander von Humboldt-Foundation and was selected as a Leibniz Professor, honors that represent the high standing Dirk has achieved in his work both here in the U.S. and abroad.

Outstanding faculty are the foundation of strong departments, and as measured by the 2010 NRC rankings of 160 doctoral programs, the UIC Department of Physics ranks in the top 11-60% for Research and top 5-21% for Diversity. The 2010 US News graduate program ranking places us at the top 42% level out of a total of 166 programs. And I fully expect our departmental ranking will continue to climb, especially with all of the new exciting research being undertaken, including, for just one example, everything now possible with our very own beautiful new $3 million-dollar aberration-corrected scanning transmission electron microscope that Robert Klie opened in January 2012. The continued success of the department is also mirrored at the university level where a recent U.K. Times Higher Education ranking placed the University of Illinois at Chicago as 11th on a list of the world’s best young universities. UIC was third highest among U.S. institutions and overall only nine U.S. institutions made the list of 100. We are truly moving forward both as a department and as a world-class institution.

On the teaching front, Robert Klie received a 2011-2012 Teaching Recognition Program award given to a select group who exemplify “the high quality of instruction that characterizes the best of UIC.” Randall Espinoza received a coveted Silver Circle award. With his selection by a vote of the more than 2000 graduating seniors, Randall has continued a long-standing tradition dating back to 1974 when Howard Goldberg was the first physics faculty member to win a Silver Circle.

On the departmental faculty and staff side, I am very happy to report that Robert Klie was promoted to the rank of Associate Professor with tenure. In addition Dirk Morr and David Hofman were promoted to Full Professor, and Yong Chang was promoted to Research Associate Professor. Charles Rhodes transitioned to Emeritus status and continues to lead a robust, fully-funded research program with his X-Ray Microimaging and Bioinformatics Laboratory. We give a warm welcome to new staff members Elizabeth Kocs, Melissa Mattingly, and Brian Shim who joined the department. You can read more about them in this newsletter. We also wish all the best to our departing Assistant to the Head Stephanie Chamberlin and Business Manager
John Fudacz. Stephanie became Assistant Director of the School of Literatures, Cultural Studies, and Linguistics and John is an Assistant Dean at the College of Liberal Arts and Sciences. Both Stephanie and John played key leadership roles in the department for many years, Stephanie since November 2005 and John since January 2005. We thank them both for their wonderful service.

In fall 2011 we welcomed eighteen new graduate students into the Department of Physics. As always, they come from all around the world – this year specifically from China, Germany, India, Turkey and the USA – and we look forward to their future success and accomplishments. We are also happy to have been able to congratulate twelve physics graduate students who completed and successfully defended their doctoral dissertations from summer 2011 to spring 2012. And speaking of graduation, on the morning of May 6, 2012, the attendees to the College of Liberal Arts and Sciences graduation ceremonies at the UIC Pavilion, consisting of more than 6,000 family, friends, and faculty supporting over 1,500 graduating students, were treated to a commencement address by none other than our very own George W. Crabtree. You can read his address entitled “Inspiriting the Future” at the AtLAS web site: http://atlas.las.uic.edu/atlas/2012/7/celebrating-las-events-past-and-future/inspiring-the-future.

On August 29, 2012, at 12:30pm, along the edge of our very own backyard baseball and soccer field just south of our SES building, Illinois Governor Pat Quinn stepped in front of a podium set up under a UIC-emblazoned tent to announce that the State of Illinois has released $64 million for the new Advanced Chemical Technology Building. An artist’s rendition of the building is at the top of page 2, and if you look closely in the background you will see our SES building, which will be directly connected to the shiny new ACTB. This new research-focused building will house faculty from chemistry, biology, and, yes, physics. Groundbreaking is expected in 2015. We are confident this new building will be an important part of a transformation that moves forward the research endeavor in our department and at UIC. Truly exciting times are ahead.

And finally I would also like to express my appreciation to everyone who has helped me fill in over this past year for our Department Head Henrik Aratyn, who is serving as a Visiting Dean at the College of Liberal Arts and Sciences. It has been a very rewarding and challenging experience and a true privilege to be able to work in such an outstanding department with wonderful supportive colleagues and bright and energetic students.

David Hofman, Professor and Acting Department Head
Focus on Teaching.

Visiting Professor Presented Silver Circle Award

Since 1966, the Silver Circle Award has been presented to some of UIC’s best teachers. Winners, who are honored at their college commencements, receive $500 and their names join a long list of distinguished colleagues. But what makes the award especially meaningful is its selection committee: the graduating seniors.

In April 2012, Department of Physics Visiting Research Assistant Professor Randall Espinoza was selected for the Silver Circle Award. Espinoza came to UIC from in Costa Rica in fall 1998 to study for his PhD which he earned in 2005. Since then, Espinoza has established himself as an integral member of the department. He conducts research with Professor Tom Imbo on Exotic Quantum Statistics and Generalized Quantum Entanglement and their application to describe new states and phase transitions in Condensed Matter Systems. He has helped enhance demonstrations to enrich physics introductory courses and has taught Introductory Physics I, Introductory Physics II, Astronomy and the Universe, The Physics Universe, General Physics I and general Physics II.

It is for his excellence in teaching that Espinoza was honored with the 2012 Silver Circle Award. “I like the feeling of making something that’s hard understandable,” says Espinoza. Espinoza tries to put himself in the student’s seat when preparing a lecture. “If I introduce a concept like an electric field, I think, what’s the first thing that would confuse a student? So I start with the basics. But that’s usually not the way it’s taught. Most start with a complicated problem. I do it the other way. I start with simple questions, then students get it, and I build from there.”

Espinoza finds students learn better if he can present material visually, instead of mathematically.

“I always hated problems that looked extremely complicated for no reason. It’s like it was complication for the sake of complication,” he says. “Physics shouldn’t be scary,” he says. “It’s not. It can be a lot of fun.”

This article is adapted 4/25/12 UIC News article written by UICNEWS staff.

Members of the Physics faculty have won a total of 11 Silver Circle Awards since the award’s inception in 1966. Awardees include:
Howard Goldeberg, 1974
Seymour “Sy” Margulies, 1975, 1977
William Anderson, 1979
Julius Solomon, 1980, 1983
Larry Ables, 1981
Clive Halliwell, 1985
David Hofman, 2007, 2010
Randall Espinoza, 2012
Teaching laboratory Updates

The Department continues our tradition of investing time, resources, and expertise in the development, construction, and implementation of new and stimulating improvements for our undergraduate teaching laboratories. This past year has seen many exciting changes, especially in the universe of Physics 108, our second semester introductory physics laboratory, and Physics 244, our third semester modern physics course.

Physics 108 is geared for pre-health students and covers electromagnetism, optics, and select modern physics topics, including quantum mechanics and nuclear physics. We’ve completely modernized the laboratory sequence, making it a series of quantitative computer-based experiments that help make the physics come alive as well as providing hands-on experience with modern equipment. And our approach is uniquely UIC Physics – that is, we design the experiments in-house, have them constructed in-house by our expert instrument makers who also make instruments for our faculty’s cutting-edge research, install them with help from students, and then complete the circle by developing tailor-made curriculum that are a perfect match to the equipment and the physics being taught. For the Physics 108 modernization, we were able to base many of the experimental hardware designs on Clive Halliwell and Zahid Ali’s work on modernizing the 142 labs, but with some notable new contributions to the sequence that include:

- An electromagnetic waves experiment focusing on the linear polarization of microwaves, using a transmitter that emits linearly polarized waves with a 3 cm wavelength. These waves are detected by a receiver antenna, and the macroscopic wavelength can be made tangible for students by directing the waves through grating made of aluminum bars, as shown in the picture. Understanding the mechanism by which the aluminum grating performs as an effective polarizer is conceptually difficult, and we’ve observed students having vibrant discussions aimed at uncovering this interesting physics.

Students discussing the transmission of linearly polarized microwaves through a macroscopic linear polarizer.
Ultimately, these computer-based labs allow the students to explore much more physics over the course of the semester.

One of the next projects is to modernize the 244 modern physics lab, taken by physical science and engineering majors. Currently, the lab is heavily focused on nuclear experiments, so new experiments will focus more on quantum mechanics. Additions will include a Frank-Hertz experiment, a Zeeman Effect apparatus and a novel acoustics experiment designed by Teachspin, which draws a quantitatively compelling analogy between atomic hydrogen electron wave functions and acoustic modes in a spherical resonator. In addition, we plan to have students perform their analyses in NI LabVIEW software, hopefully giving them a valuable introduction to what has become an industry standard in science and engineering.

- An updated version of a Photoelectric Effect experiment. In its previous incarnation in Physics 108, this experiment involved shining filtered light from a mercury lamp onto a phototube containing a cesium antimonide metal plate, and the resulting photocurrent was detected using a hand-held multimeter. Unfortunately, the multimeter did not have sufficient precision to measure the stopping voltages, and in fact, it systematically measured the voltages incorrectly. Consequently, the students would typically get experimental values for Planck’s constant and the CsSb work function that were, on average, around 30% below the actual values. To do the experiment more precisely, we could have purchased a costly nanometer off the shelf, but we devised a much simpler technique for measuring the stopping voltages. Since the lit phototube acts as a constant-current source, we placed a resistor in the circuit and simply measured the resulting resistor voltages. This technique has consistently yielded significantly better results. In the fall of 2011, students measured average experimental values of both Planck’s constant and the work function to within 10%.

- An experiment involving the counting statistics of radioactive beta decays from a Tl-204 source. The previous version of this experiment had three major setbacks: high voltage was required to power the GM tubes; characterizing the tubes was time-consuming; and without the aid of a computer, it took students a great deal of time to generate the counting histograms. In fact, to fully characterize the apparatus and do a very cursory statistical analysis of counting random events took two entire lab periods. We purchased new, inexpensive GM counters that operate at 5 Volts, and with the help of faster data collection using the computer, in a single lab session we are able to not only do a thorough statistical analysis of the Poisson distributions, but also to investigate the $1/r^2$ dependence of the source and bring in half-life considerations. Again, much more physics in much less time.
New Zeeman Effect Lab created for Physics 244 - Modern Physics

Over a year ago Dr. Shriprakash Patel, a Visiting Professor from the University of Mumbai, India who has inspired UIC summer students taking Physics 244, started thinking about how to make the exciting world of modern physics come alive and become more than “just” equations founded in quantum mechanics. That thought led to actions that bore fruit for UIC students this summer when Dr. Patel collaborated with Dr. Andrew Tillotson and UIC physics graduate student Brian Kaster to find a way to be able to directly observe and study one of nature’s more amazing quantum mechanical effects known as the Zeeman Effect, what results when the energy levels of an atom split when that atom is placed in a static magnetic field. Such an effect is important in everything from having a MRI at the hospital to Nuclear Magnetic Resonance Spectroscopy techniques used worldwide in basic scientific research.

From left to right - Shirprakash Patel (foreground and talking to Dr. Tillotson off camera), UIC Physics graduate student Brian Kaster, Anjum Ansari and Randall Espinoza (who will be teaching physics 244 fall semester 2012).

Graduate Teaching Assistant Mario Camuyrano explains the apparatus to Physics 244 students and prepares to take the first-ever set of data to be analyzed by students in the first lab.

The team that created the new lab – from left to right – Shrirakash Patel, Brian Kaster, Andrew Tillotson.
After she announced the discovery of the elusive, subatomic single top quark in 2009, was there any work left for physics professor Cecilia Gerber?

Evidently, there’s been plenty.

“That observation was done with only about one-quarter of the data from the Tevatron,” says Gerber, referring to the recently retired particle collider at Fermilab.

She and her students have since analyzed another quarter of Tevatron’s collective data set, finding more evidence to support her claim.

Gerber’s “succeeded to promote measurement of a very faint signal of the single top quark from a status of mere evidence to a firm discovery,” says physics professor Henrik Aratyn.

Her discovery triggered a cascade of accolades, including — among others — being named University Scholar and a fellow of the American Physical Society.

Now she’s added a Researcher of the Year title.

“The discovery is a reward that just keeps giving,” Gerber observes with a chuckle.

The purpose of the UIC Researcher of the Year Award is to recognize the efforts and commitment of those researchers who are advancing the knowledge in their area of expertise and to inspire and promote continued excellence in research at UIC.

Annually, the UIC Researcher of the Year Award is given to four UIC researchers who have demonstrated outstanding research achievements in their field of expertise. One awardee is selected from each of the following four categories of research: Social Sciences and Humanities, Natural Sciences and Engineering, Clinical Sciences, and Basic Life Sciences.

After she finishes analyzing Tevatron’s complete particle collision data set sometime this year, Gerber will turn her attention to analyzing data from the world’s newest atom smasher, the Large Hadron Collider that tunnels beneath the border of France and Switzerland.

The collider creates energy levels thought to be comparable to when the universe was born. Scientists predict its data will confirm the existence of the Higgs boson — a long-sought missing piece to particle physics’ Standard Model. That subatomic bit is believed to give other particles their mass.

The techniques Gerber developed for her analysis play a key role in clearing away the jungle of particles clouding observation of the Higgs.

But if it’s found, will all knowledge of physics be complete?

Hardly, Gerber says.

New experiments at the Large Hadron open the possibility of finding even more exotic subatomic particles.

It may seem like Alice in Wonderland, but for physicists, she says, this is high-energy excitement.

“We’re entering a new area and an unexplored energy with the LHC, so I’m really excited about the possibility of finding something in the experiments that will have to be explained by new theories,” Gerber says.

“I just look for an unexpected signal in the data.”

This article is adapted 2/8/12 UIC News article written by Paul Francuch.
In June 2011, after 33 years in the Department of Physics at UIC, Dr. Charles Kirkham Rhodes, Albert A. Michelson Professor of Physics and Director of the Laboratory for X-Ray Microimaging and Bioinformatics, announced his retirement. For those that know him best, what happened next was no surprise: Rhodes kept working.

On March 28, 2012, over 60 colleagues, students, and former students came together at the UIC Forum for a symposium to celebrate Dr. Rhodes’ work. Jack Jaffe, Paul Hoff, George Gibson, and Gerd Marowsky flew in from across the United States and Europe to give talks. Gerd Marowsky talked about the German Research Landscape, his work at the Laser-Laboratorium in Gottingen, and true to the historical roots of symposiums, even used Greek in his talk.

George Gibson was a student of Dr. Rhodes in the 1980s and is now Professor of Physics at the University of Connecticut. Gibson gave a talk entitled “The Physics of Charge-Assymetric Molecular States” where he discussed some of his early work as a student for Rhodes, including an important 1989 paper on the fluorescence of a previously unobserved state in $N_2^{2+}$ via a strong laser field that met with initial resistance and provided a foundation for Gibson’s future work as a postdoc and professor.

Eric A. “Rick” Gislason, Professor Emeritus in the Department of Chemistry, former Interim Dean of the College of Liberal Arts and Sciences, former Vice Chancellor for Research and former Interim Chancellor, provided a UIC perspective on Dr. Rhodes’ 33
years at the institution stating, “Charles came to UIC in 1978 as Professor of Physics from Stanford Research Institute, where he had established himself as an outstanding scientist. At UIC he immediately developed a strong research program in both experimental and theoretical physics. In 1986 Charles created the Laboratory for X-Ray Microimaging and Bioinformatics where he serves as Director. UIC recognized the exceptional quality of his work by giving him the title of the Albert A. Michelson Professor of Physics in 1987. He also holds joint appointments in three Departments in the College of Engineering, namely Electrical and Computer Engineering, Bioengineering, and Computer Science. UIC recognized him with two other honors in the past, Inventor of the Year in 2000, and with the University Scholar Award in 1994, the highest honor we give to a researcher. Charles has published over 300 papers in his career and has attracted over $50 million for support of his academic and corporate work. Finally, Charles has been awarded 9 patents during his career, primarily in the area of new and improved X-Ray Sources.”

Jack Jaffe and Rhodes went through graduate school at MIT together. Jaffe emphasized the essence of their long friendship: “I value Charles for both the intensity of his intellectualism, and for the intensity of his loyalty and steadfast concern for the well-being of his friends. He is a really smart guy with a really big heart. And with a frightening big laugh!”

Paul Hoff was a faculty member at MIT before he went to Lawrence Livermore Labs where together with Rhodes he invented the rare excimer laser. Their involvement continued through Hoff’s final assignments, which included managing large multi-disciplinary DARPA sensor programs including MIUGS and Wolfpack.

After the invited talks, Dr. Rhodes presented a colloquium titled “Storytime: UIC History and Highlights.” The Symposium concluded as the Greek origin of the word denotes with food, drink, and the sharing of even more memories from the last 33 years at a reception at the UIC Forum.
**Achievements**

**George Crabtree** gave the commencement address on May 6 at the 2012 LAS Commencement Ceremony. He spoke on the topic of “Inspiring the Future”, addressing global culture, competition and cooperation. “The challenge is to actively innovate, understand change that is coming, integrate across boundaries, and reach for disruptive opportunities that will improve your lives and the lives of others.”

**Serdar Ogut** was named an APS Fellow “for his contributions to understanding and predicting properties of nanostructures and bulk defects, surfaces, and interfaces through the development and application of first principles computational techniques”. There is an absolute cap on the number of Fellows that can be elected annually, equal to 1/2 of 1% of the Society membership.

**Christoph Grein**, was elected SPIE Fellow for achievements in novel mercury cadmium telluride materials and infrared detectors. SPIE, the international society for optics and photonics, was founded in 1955 to advance light-based technologies. Serving more than 180,000 constituents from 168 countries, the Society advances emerging technologies through interdisciplinary information exchange, continuing education, publications, patent precedent, and career and professional growth.

**Dirk Morr** has been selected as the 2011/2012 Leibniz Professor at the University of Leipzig, Germany. This prestigious professorship is awarded to internationally renowned scientists to promote interdisciplinary approaches to teaching and research in Leipzig.

**Nikos Varelas** received the first LAS Faculty Service Award. The award recognizes extraordinary contributions to LAS via direct involvement with College committees and initiatives and through service to their Departments, professions, and the community that bring benefit to and further the mission of the College.

**Robert Klie** was selected by the UIC Council for Excellence in Teaching and Learning to receive a 2011-2012 Teaching Recognition Award. These awards are given to a select group who exemplify the high quality of instruction that characterizes the best of UIC.

**Dirk Morr** has been awarded a Fellowship by the Alexander von Humboldt-Foundation to conduct research at the Max Planck Institute for the Physics of Complex Systems in Dresden, Germany. Prof. Morr will use this Fellowship to collaborate with research groups in Dresden to understand the emergence of strong correlation effects in heavy fermion materials.

**Faculty Promotions 2011**

David Hofman: Promotion to Full Professor
Robert Klie: Promotion to Associate Professor with tenure
Dirk Morr: Promotion to Full Professor
Yong Chang: Promotion to Research Associate Professor
The world of electron microscopy has undergone a revolution in recent years with leaps in the performance of electron optical elements, sources, and detectors. While instruments are becoming ever more powerful, their complexity is also multiplied. This trend places renewed emphasis on facilities that gather state-of-the-art instrumentation and world-leading experts in the field. The RRC-East, located on the west side of the Science and Engineering South building, was one such pioneer, opening the frontiers of electron microscopy to the scientific community in 1998 with the highest resolution 200 kV scanning transmission electron microscope in the United States.

In summer 2011, installation began on the UIC JEOL JEM-ARM200CF, which is again the highest resolution 200 kV STEM/TEM in the United States. On January 20, 2012, an inaugural ceremony was held to celebrate the launch, with addresses by then Vice Chancellor for Research Joe G.N. “Skip” Garcia (Dr. Garcia is now Vice President for Health Affairs at the University of Illinois Hospital & Health Sciences System), College of Liberal Arts and Sciences Dean Astrida Tantillo, College of Engineering Dean Peter Nelson, and Acting Head of Physics David Hofman.

“With the acquisition of this piece of equipment, we have the opportunity to do some really spectacular things. We clearly have the opportunity of leading the field and increasing the recognition of the valuable contributions we have as an institution in the area of imaging,” says Garcia.

The $3 million instrument promises new levels of sharpness, spatial separation, and color correction in its atomic-level views of materials. Associate Professor Robert Klie, the project’s lead investigator, explains, “What’s unique is we can use so-called in-situ stages to do experiments in a range of temperatures. We can heat a sample up to 1,000 degrees centigrade or cool it down to liquid helium temperatures [and] we can maintain the resolutions.” So what kinds of resolutions are we talking about? “We can look at one atom and probe or ‘tickle’ it to see how it bonds to a neighboring atom. This is unprec-

“ARM can do wonders for imaging single atoms. The spherical aberration corrector sweeps out all the blurring in the image, and improves the spatial resolution to 78 pm, with which we could study the atomic structure in an atom-by-atom way. Also with annular bright field imaging, we can observe light elements, even hydrogen, simultaneously with heavy elements. We are also able to study the electron fine structures such as crystal field splitting and spin-orbit splitting, with a 0.35 eV energy resolution provided by the cold field emission gun. We can even observe ferroelectric polarization directly in an image, and switch the polarization using an in-situ specimen holder.” Qiao Qiao, Physics PhD student
edent," Klie says.

Funding for the instrument comes from a $2 million National Science Foundation grant, with remaining costs covered by the Colleges of Liberal Arts and Science and Engineering and the Office of the Vice Chancellor for Research. Other principal investigators in the NSF-funded project include Sivalingam Sivananthan, physics; Christos Takoudis, chemical and bioengineering; G. Ali Mansoori, bioengineering; David He and Farzad Mashayek, mechanical and industrial engineering; Siddhartha Ghosh, electrical and computer engineering; Serap Erdal, environmental and occupational health sciences; and Alan Nicholls, Research Resources Center.

The microscope, manufactured by Japan Electron Optics Laboratory, arrived at UIC in July 2011. Shipment was delayed by Japan’s devastating earthquake and tsunami on March 11. The microscope was on a boat for shipment the day the disaster happened.

The instrument is the only one of its kind located in a city, and therefore near disruptions that could affect its performance. “Usually these electron microscope labs are built far away from any infrastructure that could perturb the environment,” says Klie, pointing out UIC’s proximity to the CTA Blue Line, the adjacent confluence of the Dan Ryan, Eisenhower, and Kennedy expressways, and the broadcast masts atop Willis Tower transmitting powerful radio and TV signals. But the unusual architecture and shape of the SES location turned out to be surprisingly stable, according to Klie. “Part of it is just pure luck in the architecture. It’s built in such a weird shape, and the floor dampens out all the vibration.”

UIC researchers already have plans for their newest microscope, including the study of nanotubes, semiconductor nanoparticles, geochemical processes, and elements used as catalysts. Both private and academic researchers can book time on the instrument through Nicholls, the director of electron microscopy services.


Graduate students and Professor Klie with the microscope

Professor Klie, Dean Tanillo, Dean Nelson, and Vice Chancellor for Research Garcia inaugurating the microscope
Florent Lacroix
Lacroix studied at Blaise Pascal University in Clermont-Ferrand, France and received his PhD in 2008. He began working for Dr. Richard Cavanaugh and the particle physics group in January 2009. He searches supersymmetric signals with the CMS detector.

Hua Pei
Pei received his PhD in 2008 from Iowa State University. He began working for Dr. Olga Evdokimov and the nuclear physics group in January 2009.

Pedro Schwaller
Schwaller received his PhD from University of Zurich in 2010. He joined UIC in September 2010 and works with Dr. Wai-Yee Keung. He is investigating why there is more matter than anti-matter in the universe, what dark matter is made of, and what kind of new physics the LHC might detect.

Cris Adriano
Adriano received her PhD in 2009 from the Gleb Wataghin Physics Institute at the Universidade Estadual de Campinas in Brazil. She began working for Dr. Juan Carlos Campuzano in June 2012.

Todd Springer
Springer studied at University of Minnesota and received his PhD in 2009, and previously held a postdoctoral position at McGill University in Montreal. He began working for Dr. Misha Stephanov in September 2011. His research focuses on the liquid-like properties of the hot, dense matter created in heavy ion collisions at RHIC and at the LHC.

Sabina Tatur
Tatur received her PhD in 2008 from Université de Montréal. She began working for Dr. Mark Schlossman in April 2011 on a project that investigates the mechanism of gold nanoparticle formation at the liquid-liquid interface by X-ray reflectivity and grazing-incidence small-angle X-ray scattering.

Yuting Bai
Bai studied at the National Institute of Subatomic Physics in Amsterdam and received her PhD in 2007. She began working in the nuclear physics group for Dr. David Hofman and Dr. Olga Evdokimov in June 2009. She has been working on measurements of charged particle azimuthal correlations in PbPb collisions at CMS.

Magdalena Malek
Malek received her PhD from Institut de Physique Nucléaire d’Orsay in France in 2009. She joined UIC in October 2009 and works with Dr. David Hofman and the nuclear physics group. She is working on the physics of heavy ion collisions and in particular on forward physics. The study of the forward region allows one to explore the high energy limit of QCD where the parton density is very high and time dilation effects are very strong.

Wei Bu
Bu received his PhD in 2009 from Iowa State University. He began working for Dr. Mark Schlossman in September 2009. He focuses mainly on studying the interfacial structure of a model solvent extraction system by using x-ray surface scattering techniques.

Derek Strom
Strom received his PhD from Northwestern University in 2009. He joined UIC in May 2009 and works for Dr. Cecilia Gerber and the high energy particle physics group. At the CMS Experiment he is involved in operations of the silicon microstrip tracking detector and fundamental research searching for signatures of beyond the standard model physics.

Mrinal Bera
Bera received his PhD in 2010 from West Bengal University of Technology, India. He began working for Dr. Mark Schlossman in November 2011. Bera is presently working on the ordering of charged nanoparticles at electrified liquid/liquid interfaces by electrochemical and X-ray scattering techniques.
Scholarships and Awards

A distinguishing feature of a UIC undergraduate education is the opportunity for direct involvement in high quality research in a variety of academic disciplines. Research-active undergraduates make meaningful mentoring connections with faculty members, discover their interests, learn valuable research skills, and are better prepared for graduate school and careers. Faculty members gain valuable research assistance and contribute to undergraduate success. Through your support, we have been able to fund the following paid research internships for our majors:

UIContest Research Internship 2010-2011: Natalie Kryzanowski and Eric Stachura.

UIContest Research Internship 2011-2012: Brian Stafford.

Sivananthan Undergraduate Research Fellowship (SURF) is awarded annually to full-time undergraduate students interested in doing physics research during the summer. Summer 2012: Thomas Bsaibes.

Our undergraduates have garnered the following additional awards in recognition of their academic successes:

Inder P. and Uma Batra Physics Undergraduate Award for outstanding performance in Physics 141: Weixin Wu (Fall 2010), Randie Rae Molina (Spring 2011), and Margaret Shang (Fall 2011).

Seymour Margulies Scholarship for outstanding performance in Physics 215 and Physics 401: Ashoordin Ashoormaram (Physics 215, Spring 2010; Physics 401, Fall 2011), Tadas Paulauskas (Physics 401, Fall 2010), and Przemyslaw Dzik (Physics 215, Spring 2011).

Ogden Livermore Scholarship for outstanding performance in Physics 244: Long N. Doan (Fall 2010), Sasidhar S. Madugula (Spring 2011), and Quan Yang (Fall 2011).

The Larry Abels Memorial Scholarship: Natalie Kryzanowski (2010-2011) and Ashoordin Ashoormaram (2011-2012).

2011-2012 Graduate Theses

Dingfei Ai, “Study of Spectral Function Scaling Property of High Temperature Superconductors;” Campuzano

Ioana Anghel, “Measurement of the Top Quark Pair Production Cross Section in 7 TeV pp Collisions;” Gerber

Chiu-Hao Chen, “Determination of the Configuration of Membrane-Bound Protein;” Schlossman

Cosmin Dragoiu, “Dijet Azimuthal Decorrelations in Proton-Proton Collisions at a Center of Mass Energy of 7 TeV;” Varelas

Stephen Fahey, “Selective Area Epitaxy of CdTe on Nanopatterned Substrates;” Sivananthan

Binyang Hou, “ion Distributions at Electrified Liquid-Liquid Interfaces: Microscopic and Macroscopic Measurements;” Schlossman

Shahab Khan, “Development and Investigation of a Super Intense Guided Laboratory Scale X-Ray Source;” Rhodes

Nouamane Laanait, “Ion Correlations at Electrified Soft Matter Interfaces;” Schlossman


Ernest Robinson, “Extraction of Material Properties and Defect Levels and Densities from Electrical Measurements;” Sivanathan

Stephanie Schieffer, “Dual-Passive Mode Locking of High Average Power, Solid-State Lasers;” Schroeder

Yuan Zhao, “An Investigation of the Catalytic Mechanism of Cobalt-based Fischer-Tropsch Catalysts by STEM;” Klie

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Around the Department

SISE Leads the Way

With an unseasonably warm winter and record-setting hot summer behind us, climate change and energy use has been on the forefront of many people’s minds. Clean, renewable and alternative energy sources, innovative energy technologies and sustainable practices are increasingly important issues that will face more and more decision makers. But for many, this is new territory requiring study and greater knowledge.

Today’s energy issues are “getting much more interconnected and complex,” says George Crabtree, physics professor and UIC’s special adviser on energy, “but we’re not training the students — the next generation of professionals — to deal with this level of complexity. You have to think in a different way.”

The Summer Institute on Sustainability and Energy helps to fill this training gap. SISE held its inaugural institute August 9-17, 2011. The institute brought together participants from around the country with backgrounds in science, engineering, business, urban planning, and public policy and allowed them to spend time with faculty, top administrators and executives from participating institutions, businesses and the Environmental Protection Agency. Participants spent an intensive nine days attending lectures, discussions, group projects, career counseling, mentoring and networking sessions, and various site visits. For this second annual program, SISE framed issues in sustainable energy with the upcoming 2012 presidential election and the energy perspectives of the international community.

The Institute was not all theory. Crabtree said, “We gave them a real-world challenge: solve an energy or sustainability problem in Chicago. Here’s the background. Give us the solution or innovation.” Participants worked in groups to research the problem and propose ideas, culminating in presentations on the final day.

“Transportation can be dramatically altered by electrifying cars, by replacing foreign oil by domestic biofuels, or by raising gas mileage standards. What are the implications of these changes and which is the most beneficial? How does one solution impact the others?” Crabtree asked.

“Questions like these are almost never treated in conventional approaches to energy. We want the students to explore the alternative solutions available and their effect on each other, and to come away with a global framework for analyzing how energy works.”

Based at UIC, the institute partners with Argonne National Laboratory, the University of Chicago, Illinois Institute of Technology, Northwestern University, the University of Illinois at Urbana-Champaign, and the entrepreneur-oriented Clean Energy Trust.

SISE hosted over 70 participants from around the country. While most participants were graduate students, senior undergraduate students, post docs, and professionals working in sustainable energy were also admitted.
Life of the Department

Fermilab Visit

Last April 2012, students from UIC got to participate in a one-of-a-kind tour of Fermilab with guidance from Professors Mark Adams and Cecilia Gerber. From an enormous fifteen foot bubble chamber to a wire chamber that can fit in the back of an average sedan, students were able to observe the growth of the experimental particle physics field. The group was also able to go inside the colossal D0 detector formerly in use in the Tevatron and partially responsible for the discovery of the top quark!
Department Picnic

On August 19, 2011, graduate students, faculty, staff, postdocs, researchers, and friends of the department gathered in the Chicago Circle Memorial Grove to welcome a new academic year. Jets practicing for the Chicago Air and Water Show provided the soundtrack to an afternoon of a grilled picnic lunch, bag toss playing and general merriment.

Holiday Party

Faculty, staff, and researchers joined together for a family style luncheon at Francesca’s on Taylor to celebrate the end of the fall semester and the holiday season. It was a relaxing and enjoyable afternoon of conversation, food and drink.

End-Of-Year Picnic

To celebrate the end of another outstanding academic year, graduate students, postdocs, researchers, faculty and staff came together for an evening of pizza, drinks and great conversation at Morgan’s on Maxwell on April 26, 2012.

Employee Service Recognition Event

On November 30, 2011, the department gathered to honor our members who reached major milestones of service to the university.

Leonard Apanasevich, Research Assistant Professor, 5 years
Victor Bazterra, Visiting Research Assistant Professor, 5 years
Yong Chang, Research Associate Professor, 10 years
Suk-Ryong Hahn, Research Associate Professor, 10 years
Serguei Kouznetsov, Research Assistant Professor, 10 years
Dirk Morr, Professor, 10 years
Serdar Ogut, Professor, 10 years
Alex Borisov, Research Associate Professor, 20 years
Future Physicists

Graduate Student Ji Zhao welcomed her daughter Shumei on April 1, 2011.

Visiting Research Assistant Professor Victor E. Bazterra and his wife Florencia Rodriguez-Brasco welcomed Julieta in July 2011. Weight: 6 lbs. 6 oz. Length: 18 inches
Disclaimer: We raise her to choose her own destiny.

Graduate Student Sankar Poopalasingam and his wife Yoga Velmurugu welcomed their daughter Biranavi on May 9, 2012. Weight: 6 lbs. 2.2 oz. Length: 20 inches

Undergraduate physics major Brian Stafford and his fiancée Maggie Plog welcomed Eleanor Ann Renee Stafford on September 1st, 2011. Eleanor has an older sister Izabella.

Assistant Professor Rick Cavanaugh and his wife Petia welcomed their son Patrick Alexander Kostadinov Cavanaugh in July 2012.

Photographs courtesy of the proud parents
Arrivals and Departures

Elizabeth A. Kocs
In November 2011, Elizabeth began her new role as the Director of Programming and Outreach at The Energy Initiative. She has worked at UIC for over twelve years in various capacities, including research, administration, and project management spanning the areas of architecture, planning, environmental design research, and environmental social science. When she's not at work, she enjoys spending time in the outdoors - camping, hiking, and roughing it for days without electricity, plumbing, or running water. She also loves to dance.

Melissa Mattingly
Melissa joined the Physics Department in June 2011 as the Assistant to the Head. She brings with her seven years of experience as the Admissions Counselor for the Honors College at Michigan State University. In her spare time, she enjoys knitting, reading, and watching documentary films.

Brian Shim
Brian began work as the Business Manager in June 2011. Prior to coming to the physics department, he held several other positions at UIC: he was the Grants Manager at the Department of Electrical and Computer Engineering, the Research Coordinator at the Office of Research Services, and the Project Coordinator at the School of Public Health. Brian plays guitar and the drums, practices martial arts, and plays racquetball.

Departures:

John Fudacz
After 6 years in the Department of Physics as the Financial Assistant to the Head, John accepted a position as Assistant in UIC’s College of Liberal Arts and Sciences.

Stephanie Chamberlin
After 4 years in the Department of Physics as the Assistant to the Head, Stephanie accepted a position as Assistant Director in UIC’s School of Languages, Cultural Studies and Linguistics.

Retirements:

Bob Kurdydyk, Instrument Maker, retired after 19 years of service at UIC, 18 of those years with the Department of Physics.

Zahid Ali, Electronics Engineer, retired after 28 years of service at UIC and the Department of Physics.

Congratulations on your retirements and thank you for your service!

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Tell us what first sparked your interest in science and at what age?

I’ve been fascinated with science as long as I can remember. I do remember when I was quite young — I couldn’t have been older than 7 — reading Carl Sagan’s Cosmos from cover to cover. That definitely struck a chord with me!

What was the most valuable student experience you had or thing you learned while at UIC?

I think the most valuable lessons I learned actually had very little specifically to do with physics. My advisor, Russell Betts, gave me a great deal of independence -- maybe too much! I had to learn early on how to seek advice and help from fellow collaborators and domain experts. I also spent a lot of time chatting with the theory students in the next office over about various and sundry topics including physics.

It’s important not to compartmentalize your work, which is difficult to do in an era of intense specialization.

Please share with us a fond memory of your time at UIC.

It’s difficult to choose just one: it’s not a fond memory, but I do still remember the overwhelming relief when I passed my qualifying exams (and thesis defense, much later on)! I do remember the time we had a tin of leftover mustard from a collaboration meeting, giving us an excuse to have an impromptu hot dog and hamburger barbecue on the little balcony outside our offices. And I remember struggling to get a cleanroom and detector characterization equipment set up in our lab, on the cheap, and the sense of accomplishment when it was up and running.

How would you describe “Big Computing” to the lay person? How did you choose this field of work?

“Big Data” is the buzzword of the last year or two, but processing big data requires big storage, big computing, big networking, and the software on top to support it. The funding agencies like to talk about “Petascale” (10^15) and “Exascale” computing (10^18); if I just say “Big,” it’s future-proof! For now, “Big” is closer to the Petascale. The LHC experiments produce dozens of Petabytes per year. Facebook - with more than a billion active users -- stores around 200 Petabytes.

This field really chose me more than I chose it! At UIC, I was responsible for some fraction of my thesis experiment’s data processing, but also for maintaining all the computers for the group. On my postdoc experiment, my responsibility increased from developing components of the online monitoring and data transfer systems to eventually becoming the head of computing for the experiment. It was at that point when I realized that the computing side of physics held as much or more interest for me as the research side. One of my colleagues pointed out Fermilab’s Computing Division as a good fit, and it seems to
Where do you see computing going in the next 10 to 20 years?

I’m not sure I can visualize 3 years out, much less 10 or 20, so hopefully no one will dig this out in 2033 to show just how wrong I am. But my best guess: our demand for Big computing will continue to grow (hopefully linearly rather than exponentially.) Moore’s Law (the number of transistors in an integrated circuit doubles every 18 months) will continue, but the practical application will be different. Even now, the chip manufacturers have moved away from increasing clock speeds to packing more and more cores on a chip. If this trend continues, we will need a major industry focus on keeping the data pipeline full. This also ties into networking: 100 Gigabit is moving into production on research networks, and terabit is around the corner.

Network resources, long delegated as afterthoughts behind computing and storage, will be treated as allocatable first-class citizens in the computing models of the future. I think storage will continue to grow in a similar fashion. The current disk drive technology is not far from its limits, but there are new ways of recording bits to magnetic platters around the corner that seem promising, and there’s potential in the long term for revolutionary new techniques.

What advice would you have for today’s physics students?

It’s all contradictory: stay active in your research field, but stay broad-minded. Work hard, but remember that you have a life outside of your studies!

What do you find is the most exciting topic/area in physics/science today?

Well, I should of course mention heavy ion physics -- the LHC has opened up the latest energy frontier and there many, many interesting results about the nature and structure of matter. And I’m also glad to know that I contributed in some small way to the discovery of the Higgs Boson. Also: I think many non-LHC areas of science are also transitioning to Big Data-driven approaches, which is also very exciting -- it enables new cross-cutting areas of inquiry using datasets whose scale would have been unthinkable a decade or two ago.
Everyone has the opportunity to create brilliant futures for the Department of Physics. When you make a gift to the Fund for Physics, it is utilized by the department head to have an immediate impact on students and faculty of the department.

Your generosity is put to good use toward scholarships, enhancing student-related programs, and supporting faculty travel to conduct and present research around the globe. You can help us continue to provide opportunities for excellence to our students.

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Thanks as always for your support!

The Gift That Keeps on Giving! Alumni Volunteerism!

As a graduate with a degree from LAS, we count you among the members of the Liberal Arts and Sciences Alumni Association. Now more than 63,000 strong, we reflect the rich diversity of our student body. Volunteering with the LASAA is a wonderful way to connect with the college – our faculty, students, and fellow alumni.

Opportunities to volunteer are plentiful. Throughout the year, alumni share their time and talents on campus in many ways. Alumni meet with the students to talk about their career paths, speak on panels, offer short-term mentoring, attend networking events, and much more.

Make this the year you connect with the LAS Alumni Association. Contact us at LASConnect@uic.edu, and we’ll help you find a volunteer opportunity of your own!