The University of Toledo

100 Years
COLLEGE OF ARTS & SCIENCES
THE UNIVERSITY OF TOLEDO

Department of Physics and Astronomy

WAVES

www.physics.utoledo.edu

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Department Chair's Comments

Greetings to all of our alumni, friends, and supporters of the department! I hope this newsletter finds you well. Our department continues to thrive, even in these challenging times. As you will read in this newsletter, our programs are strong and continue to grow in both majors and research funding.

There have been a number of changes in department personnel. Sanjay Khare and Tom Megeath were both granted tenure and promoted to associate professor this past year. Al Compaan, former department chair and Distinguished University Professor, officially retired in June 2009, although he continues to be active with his research program and his involvement with the Xunlight-26 startup company. Constantine Theodosiou left the University at the end of June 2009 to accept a position as vice provost for research and dean of the graduate school at Montclair State University in New Jersey. Kathy Shan and Scott Hill joined the department in August 2009 as new visiting assistant professors and have been great additions in helping us to meet our teaching needs.

The number of physics and astronomy undergraduate majors continues to increase. Over the past three years, the number of majors in the department has nearly doubled, with a significant fraction of the growth in the applied physics and astronomy/astrophysics areas. While our total graduate student population has remained quite stable overall at around 60 graduate students, the numbers in those same sub-areas also have increased. Although the number of applications for admission to our graduate program has increased, we are limited by the number of teaching assistantships we have available to offer to incoming students each year. We are now in the process of developing a new and novel professional science masters degree in photovoltaics, which we hope will be approved in the near future.

The photovoltaics and alternative energy areas continue to garner notice, both statewide and nationally. As you will read in articles within, there are both research and education components to this effort, as well as economic development benefits for Toledo and northwest Ohio. UT has recently been designated as a Center of Excellence in Advanced Renewable Energy and the Environment, and the efforts by faculty in our department played a significant role in that designation. We also have strong connections with the recently established School of Solar and Advanced Renewable Energy (SSARE) at The University of Toledo, as well as the recently dedicated Scott Park Campus for Energy and Innovation.

The astronomy and astrophysics effort has continued to attract attention and funding. Rupali Chandar was recently awarded a prestigious NSF CAREER grant, one of the highest national recognitions of outstanding research that is awarded to young faculty members. Tom Megeath and JD Smith are both leading international teams working on designated Key Projects for the Herschel Space Observatory, a new far-infrared telescope launched last fall by the European Space Agency. Astronomers and their students continue to be awarded significant amounts of observing time at the leading observatories around the world, both space-based and ground-based.

The medical physics program, a joint venture between our department and the College of Medicine, has just received accreditation from CAMPEP, making our program one of only 24 such accredited programs in the nation. You can read more about this exciting news elsewhere in the newsletter.

Our Research Experiences for Undergraduates (REU) program has been ongoing for 18 years, and you can read about this past summer's activities in the accompanying article. In some very good news, Rick Irving (the REU grant PI, and Research Assistant Professor in the department) recently received notification that the program has been recommended for continued funding for another three years. We look forward to continuing this rewarding program, which brings undergraduate students from throughout the nation to UT for a summer research experience (and more!).

The planetarium continues its excellent outreach efforts to the community, attracting more than 25,000 people a year to visit and learn about astronomy and the night sky. Recently, it became the location of the planet Neptune (well, the real one wouldn't fit, so there's a poster instead) in the National Solar System Project, which is a scale model of the solar system originating at NASA's Kennedy Space Center in Florida.

We are proud of all these efforts, and hope to develop even more in future years. If you'd like to help us grow and improve, there is information elsewhere in this newsletter about how you can contribute - there are several funds established to support various efforts within the department. The department is very fortunate to have strong supporters in the community and beyond, and we are grateful to all of you.

In closing, let me just say that we value all our supporters, friends, former students and colleagues. We'd love to hear from you, so please do drop us a line sometime and tell us what you're doing these days. If you happen to be in the area, do stop in and visit us.

Karen Bjorkman

NOTABLE FACULTY NEWS

RETIREMENT OF PROFESSOR ALVIN COMPAAN

Professor Alvin Compaan, who came to The University of Toledo in 1987 and – along with **Professors Randy Bohn** and **Chen Tai** – founded the department's photovoltaics program, retired June 30, 2009 through UT's Early Retirement Incentive Program. **Professor Compaan** will continue to remain active with his research on solar energy, mentoring undergraduates, graduates and postdocs and his work with Xunlight26 Solar, a UT spin-off company.

Professor Alvin Compaan

CONGRATULATIONS TO SANJAY KHARE AND TOM MEGEATH

Congratulations to Sanjay Khare and Tom Megeath for their approved tenure and promotion to associate professor by the Board of Trustees.

Associate Professor Sanjay V. Khare

Associate Professor S. Thomas Megeath

UT PART OF $3 MILLION GRANT FOR RENEWABLE ENERGY EDUCATION.

(adapted from UT News, April 23, 2009)

The University of Toledo will lead the collaboration of four additional higher education institutions to create a unified program in renewable energy and sustainability to augment science, technology, engineering and math (STEM) degrees thanks to a five-year, $1.5 million grant from the state's premier Choose Ohio First Scholarship program. A match by the participating schools brings the total to more than $3 million. "This program will pull together the combined resources of regional higher education to increase the recruitment, training and graduation of students in the STEM fields to help supply the rapidly growing job market in sustainable energy systems in northwest Ohio," said Dr. Geoffrey Martin, interim associate dean for the natural sciences and mathematics in the UT College of Arts and Sciences, and lead investigator of the project. Martin said the grant represented some of the deepest collaboration between UT and grant partner Bowling Green State University (BGSU), as well as enhancing relationships with Owens, Terra and Northwest State community colleges. A total of 158 students from the five schools will receive scholarships to cover tuition during the grant's five-year run. Students also will participate in a bridge program which is part of a broader mentoring effort that has markedly improved the retention of students in the STEM fields. By working with colleagues at BGSU, faculty at UT hope to enhance and extend the mentoring program led by the Catharine S. Eberly Center for Women at UT that helps mentor and increase the number of women in STEM disciplines. Faculty at UT will in turn work with faculty at BGSU to enhance undergraduate research, giving BGSU students the opportunity to pursue undergraduate research projects in UT laboratories. "This program will help provide students with better scientific literacy and through internships a deeper understanding of what it takes to succeed in an industry that will need a highly educated work force," Martin said. **Dr. Tom Kvale, professor of Physics and Astronomy and director of the Office of Undergraduate Research,** Dr. Daryl Moorhead, professor of environmental sciences, and Charlene Gilbert, director of the Catharine S. Eberly Center for Women, will play key roles in the program's implementation.

Prof. Thomas Kvale

UT DEDICATES SCOTT PARK CAMPUS OF ENERGY AND INNOVATION

(adapted from UT News, September 21, 2009)

The University of Toledo officially dedicated the Scott Park Campus of Energy and Innovation on September 21 as a zero carbon footprint campus. The ceremony occurred in the shadow of a newly installed 100-foot wind turbine and near a new 10-kilowatt solar array from Xunlight by the intersection of Nebraska Avenue and Parkside Boulevard. "I believe the Scott Park Campus of Energy and Innovation will play a significant role in moving the world away from its dependence on fossil fuels, as well as serve as an extremely valuable resource for our students," President Jacobs said. The Scott Park Campus of Energy and Innovation will serve as a hands-on alternative energy laboratory used for teaching, research and demonstration, as well as to generate energy and reduce the University's carbon footprint. UT, a national leader in solar energy research, is the only university in the country to commit an entire campus to advancing renewable, alternative and sustainable energies. In addition to the many educational opportunities, the Scott Park Campus of Energy and Innovation is expected to foster regional economic development through commercialization and business incubation efforts.

UT NAMED CENTER OF EXCELLENCE FOR RENEWABLE ENERGY, ENVIRONMENT

(adapted from UT News, October 29, 2009)

Ohio Gov. Ted Strickland announced that The University of Toledo has been named a Center of Excellence in Advanced Renewable Energy and the Environment. The center will tap UT's academic and research strengths, including the strengths in the area of solar energy and photovoltaics in the **Department of Physics and Astronomy** to address the need for new clean-energy technologies and a better understanding of complex environmental systems necessary for solving global challenges. UT's Center of Excellence in Advanced Renewable Energy and the Environment's core areas of research and technology development will be focused around solar, biomass energy, wind, energy storage, conversion and management, and environmental and ecosystems. These efforts will support local industrial growth in companies that are expanding their products to become competitive in the global markets. During the last decade, UT has invested heavily in faculty and research infrastructure in the area of alternative energy and recently created a School of Solar and Advanced Renewable Energy and dedicated the Scott Park Campus of Energy and Innovation.

NEW COURSES AND MINOR IN RENEWABLE ENERGY

In collaboration with faculty members in physics and Astronomy, chemistry, chemical engineering, MIME, political science, and economics, **Professors Sanjay Khare** and **Alvin Compaan** have spearheaded the development of a University-wide Undergraduate Minor in Renewable Energy (MRE). The MRE consists of four core courses including an internship in renewable energy (PHYS 4980) and a new course developed by **Sanjay Khare** on *Physical Principles of Energy Sources for Humans* (PHYS 3400), as well as three elective courses. Included among the elective courses are a new course developed by **Alvin Compaan** on *Principles and Varieties of Solar Energy* (PHYS 4400). More information may be found at the Physics and Astronomy Department Web site at *physics.utoledo.edu.*

PROFESSOR XUNMING DENG'S XUNLIGHT LLC AND UNIVERSITY OF TOLEDO PROFILED IN SITE SELECTION MAGAZINE

(adapted from Site Selection, May 2009)
siteselection.com/features/2009/may/Toledo

A quarter century after Harold McMaster, Norm Nitschke and others in Toledo began Glasstech Solar in 1984 and then Solar Cells Inc. in 1987, Toledo has entrenched itself on the map of clean energy. The company began its research efforts in University of Toledo laboratories in collaboration with **Professor Alvin Compaan**, who led UT's efforts to build expertise in solar energy. At the center of this transformation is the 137-year-old University of Toledo, whose Science, Technology and Innovation Enterprises initiative is bringing together world-class researchers, venture capitalists, entrepreneurs and public-sector investors to foster and grow a new industry cluster based upon alternative energy. The University selected thin-film photovoltaics as an area of research focus in 2001 and worked to build expertise, laboratories and recognition in this area. At least five major solar companies have launched directly out of UT.

Dr. Xunming Deng, founder and CEO of Xunlight Corp., raised more than $40 million in venture capital to build a production facility for his photovoltaic module company. The physics professor from UT is considered one of the world's leading authorities on lightweight, flexible PV modules. His company is housed in a 122,000-sq.-ft. manufacturing plant in Toledo. "I worked on photovoltaics for 23 years, starting in graduate school at the University of Chicago," Deng tells Site Selection. "In 1996, I came to The University of Toledo, took a faculty position and built a strong research program in PV cells. My wife and I started Xunlight. We are a home-grown company." Deng says Xunlight was created "to commercialize university-developed technologies. The company has an exclusive license from the University to develop this technology, and the University owns a part of the company. It is a win-win situation."

Deng located his firm next to the school "so that the benefit of the technology transfer can be maximized," he notes. "Our competitive edge is that we are making flexible and lightweight product for PV cells. This has many off-grid PV power applications. Our product can be manufactured at an extremely low cost. We develop, design and build our own manufacturing equipment and processes, which were developed at the University." When asked why he chose to locate his company in Toledo, he said: "It took years of effort to perfect this technology, and the University has played an essential role. The University has identified thin-film PV as an area for strategic investment." Deng adds that he expects the solar sector to expand rapidly in Northwest Ohio. "Toledo area companies have the leadership for low-cost manufacturing," he says. "These companies will lead the technology and innovation in making solar power into every-day applications."

Dr. Xunming Deng and his wife, Liwei, of Xunlight Corp., hold up a piece of thin-film photovoltaic material manufactured at their plant in Toledo, Ohio.

PROFESSOR AND DEPARTMENT CHAIR KAREN BJORKMAN NAMED DISTINGUISHED UNIVERSITY PROFESSOR

(adapted from UT News, April 23, 2009)

Professor Karen Bjorkman

Professor Karen Bjorkman was named one of 6 new Distinguished University Professors at UT in spring 2009. A member of UT's faculty since 1996, **Professor Bjorkman** is considered a global expert in the measurement and interpretation of polarization data relative to B-type stars and related objects. **Professor Bjorkman's** record of extensive extramural funding, including a $500,000 NASA Long-Term Space Astrophysics Grant, which is indicative of the highest caliber research of fundamental importance to the field of astrophysics, was also cited. "We are delighted to recognize these senior faculty members for their distinguished careers and contributions to The University of Toledo," said Dr. Rosemary Haggett, provost and executive vice president for academic affairs. "These distinguished professors are the finest examples of excellence in learning, discovery and engagement." "This year's recipients are symbolic of UT's mission of improving the human condition," added Dr. Jeffrey P. Gold, provost, executive vice president for health affairs and dean of the College of Medicine. "Not only are their academic achievements impressive, but their willingness to share their knowledge exemplifies the spirit of collaborative education."

PROFESSOR ISHMAEL PARSAI HONORED FOR HIS ROLE IN ADVANCING MEDICAL PHYSICS EDUCATION

(adapted from UT News, October 20, 2009)

The International Organization for Medical Physics (IOMP) is an umbrella organization with 82 member countries and over 18000 professional members worldwide. **Prof. Ishmael Parsai**, a member of the US Medical Physics Organization AAPM (American Association of Physicists in Medicine) has been in various leadership roles within the IOMP and the editor-in-chief of the IOMP journal in the last 9 years. He has also served as one of the two US delegates to the IOMP and was sponsored by the AAPM to attend the World Congress in Medical Physics held in Munich, Germany in August of 2009. **Parsai's** work in advancing the global education of medical physicists was recognized during the conference, and he was presented with a plaque in one of the plenary sessions. In capacity of a US delegate and the ninth-year editor of the Medical Physics World, the official bulletin of the International Organization for Medical Physics, Parsai was among more than 5,000 participants from around the world who attended this congress.

MEDICAL PHYSICS GRADUATE PROGRAM RECEIVES CAMPEP ACCREDITATION

Excerpts from UT News, May 31, 2008

Professor E. Ishmael Parsai

The University of Toledo Medical Physics program prepared and submitted a self-study detailed application for accreditation by the Commission on Accreditation of Medical Physics Educational Programs (CAMPEP) last year. After an extensive review and a final site visit which took place in October, in which faculty from both the Department of Physics and Astronomy and the Health Sciences Campus participated, the University of Toledo's graduate programs in medical physics received accreditation. This includes the M.S. degrees offered in medical physics as well as the joint Ph.D. in Physics and Medical Physics degree. We thus join an elite group of 24 accredited programs in the USA and Canada. The medical physics program is directed on the Health Sciences campus by **Professor E. Ishmael Parsai**.

PROFESSORS FEDERMAN AND SHEFFER USE 3RD GENERATION SYNCHROTRON SOURCE TO STUDY CARBON MONOXIDE

Professors Steven Federman and **Yaron Sheffer**, with Jean Louis Lemaire, Michele Eidelsberg, and colleagues from the Paris Observatory, became the first outside users of the DESIRS beamline on the third generation synchrotron source, SOLEIL, which is located in a suburb of Paris. The beamline allows studies at ultraviolet wavelengths at very high spectral resolution. The project will yield improved cross sections for absorption of ultraviolet radiation by carbon monoxide and a better understanding of the steps leading to the dissociation of the molecule resulting from the absorption. This information is important for chemical models used to interpret astronomical data from disks around newly formed stars and the interstellar clouds where this takes place.

PROFESSORS HEBEN, ELLINGSON, AND COLLINS RECEIVE FUNDING TO STUDY NANOCRYSTALLINE SI AND NANOTUBE HYBRIDS

M.J. Heben, R.J. Ellingson, and **R.W. Collins** received a subcontract to work with North Dakota State University in their DOE/EERE-funded Center for Nanoscale Energy. The team will work with NDSU to understand the photovoltaic properties of films derived from the recrystallization of liquid silanes.

M.J. Heben and **R.J. Ellingson** received a subcontract from the National Renewable Energy Laboratory to work on studying the Electronic and Optical Studies of Hydrogenase-Single Walled Carbon Nanotube Biohybrids. The three-year effort is supported by DOE's Office of Basic Energy Sciences.

R.J. Ellingson also received a subcontract from the National Renewable Energy Laboratory to investigate the development of Novel Nanocrystal Based Solar Cells to Exploit Multiple Exciton Generation. The one-year effort is supported by NREL's Seed Fund initiative, and represents a collaborative effort involving Ellingson's former coworkers at NREL.

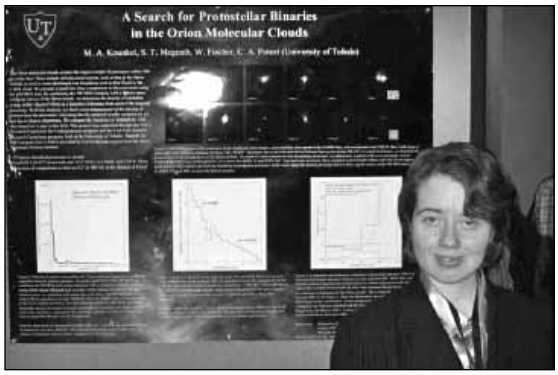
XUNLIGHT 26 SOLAR AIMS FOR CDTE ON PLASTIC

(excerpted from greentechmedia.com, September 2009)

The one-year-old Ohio start-up is developing a flexible cadmium-telluride thin film and plans to go into pilot production next year. A year ago, Xunlight 26 Solar embarked on a two-year plan to develop a production-ready solar panel of cadmium-telluride encased by plastic. The startup, which is licensing technology from the University of Toledo in Ohio, has been able to fabricate a cell that could convert 10.5 percent of the sunlight that strikes it into electricity, said **Al Compaan**, Xunlight 26 chief technology officer and emeritus professor of physics and astronomy. The startup wants to replace glass with polyimide, and use what's called a roll-to-roll process to produce the thin films, **Compaan** said. The roll-to-roll process is akin to the process used by United Solar Ovonic and Nanosolar. "We take a material proven successful mainly by First Solar, and we are trying to eliminate glass so that it's light-weight and flexible," **Compaan** said. "That will open up new markets for cadmium telluride panels." Xunlight 26 plans to complete developing a prototype panel, which would measure 1 foot by 3 feet, in 12 months, **Compaan** said. The company will then build a pilot production line.

AMERICAN ASTRONOMICAL SOCIETY MEETING

The **Department of Physics and Astronomy** had a strong presence at the American Astronomical Society in Washington, D.C. With more than 3,300 people attending, this was the largest astronomy meeting ever. Three graduate students and three professors presented posters and talks at the meeting on a variety of topics ranging from the detection of exoplanets to the luminosities of protostars. In addition, UT sophomore **Marina Kounkel** presented her first poster: "A Search for Protostellar Binaries in the Orion Molecular Cloud". The poster described research that was supported by the First Year Summer Research program and the REU program.



UT sophomore **Marina Kounkel** in front of her poster at the AAS meeting in Washington, D.C.

OTHER NOTABLE FACULTY NEWS

JACQUES G. AMAR

Awarded a National Science Foundation Award for his project **"Simulating Nonequilibrium Processes over Extended Time- and Length-scales using Parallel Accelerated Dynamics".**

RUPALI CHANDAR

Awarded a National Science Foundation CAREER Award for her project **"The Life Cycle of Star Clusters: New Windows into Star Formation and Galaxy Evolution".**

LARRY CURTIS

Published memoir titled, **"Skona Maj: An Enchanted Life".**

ROBERT T. DECK

Published book entitled, **"Development of Quantum Theory from Physical Principles"**. The book derives the entire content of quantum theory and its formalism on the basis of two physical notions: (1) the existence of (unspecified) pairs of "conjugate observables" that do not have exact values simultaneously, and (2) the required form invariance of the equations of physics under transformations between physically equivalent coordinate frames.

MICHAEL HEBEN

On the advisory board for CIMTEC 2010 - the 12th International Conference on Modern Materials and Technologies. Heben is advising on Symposium FB: Materials and Process Innovations in Hydrogen Production and Storage.

SANJAY KHARE

Awarded funding from the National Science Foundation, along with UT faculty member Ahalapitiya Jayatissa (PI), for their project **"Fundamental Investigation of Pulsed Laser Irradiation on Metal Oxide Gas Sensor Performance".**

Awarded funding from the National Science Foundation, along with UT faculty members Ahalapitiya Jayatissa (PI) and Daniel Georgiev, for their project **"Fabrication of Zinc Nitride and Zinc-Oxy-Nitride Thin Films for Photovoltaic and Optoelectronic Applications".**

Awarded funding from the National Science Foundation, along with UT faculty members Krishna Shenai (PI), Kevin Czajkowski, Duane Hixon, and Vijaya Kumar Devabhaktuni, for the acquisition of a new high-performance scalable computing and storage infrastructure to further collaborative multi-disciplinary research, education, and outreach activities.

JAMES PALMER

Received the R. R. Gregory award in April 2009 from the Upper Cervical Chiropractic Association for service in the scientific advancement of Upper Cervical Chiropractic. This is the highest award in Upper Cervical Chiropractic and is only the seventh time in 19 years that this award has been given. Professor Palmer serves as editor of its research publication The Upper Cervical Monograph.

REVA-KAY WILLIAMS

Received a National Science Foundation Award for her project **"Theoretical and Numerical Investigation of a Unified Astrophysical Rotating Black Hole Model for Active Galactic Nuclei, Microquasars, and Gamma-Ray Bursters".**

GRADUATE STUDENT NEWS

Graduate student **Michelle Sestak** won first place in the 2009 AVS Applied Surface Science Division Best Student Presentation Award for her presentation "Analysis of CdTe and CdS Thin Films and Photovoltaic Device Structures by Spectroscopic Ellipsometry" at the AVS 56th International Symposium and Exhibition in San Jose in November 2009.

Graduate student L**esley Simanton's** research with Prof. Rupali Chandar (adviser) on the life cycle of star clusters and the role they play in forming galaxies was featured in the Chicago Tribune in October 2009.

Graduate student **Victor Plotnikov** (Ph.D., August 2009) received the Best Student Paper Award in the area II-VI and related technologies, for his presentation titled "10% Efficiency Solar Cells with 0.5 micron of CdTe" at the 34th IEEE Photovoltaic Specialists Conference in June 2009.

Graduate student award winners at the 34th IEEE Photovoltaic Specialists Conference in June 2009, including UT graduate **Victor Plotnikov** (far left) and **Lila Dahal** (second from left).

MEDICAL PHYSICS STUDENTS PRESENT THEIR RESEARCH AT THE NATIONAL CONFERENCE

(adapted from UT News, October 20, 2009)

Each year more than 4,000 professional medical physicists from around the world gather for the American Association of Physicists in Medicine (AAPM) Conference to present research and attend workshops and review courses. This summer, UT medical physics students Nicholas Sperling, Bhoj Gautam, Ian Gordon and Xiance Jin attended the conference in Anaheim, Calif., to present their research. **Dr. Ishmael Parsai,** professor and director of the UT graduate medical physics program and chief of medical physics in the Radiation Oncology Department, also attended the conference as both a mentor to the students and a professional in his field. The four students received financial support from the Toledo Radiation Oncology Physician Group to attend this conference and meet other medical physicists from around the world. The group presented six abstracts with supporting materials at the conference, and all six were published in the June issue of the Journal of Medical Physics. Their presentations covered a wide range of medical topics related to an advanced radiation detector system technology (patented at UT), a new treatment modality for prostate cancer (another UT patent), a novel technique in treating superficial cancer lesions using the high dose rate Iridium-192 source, radiation dosimetry, and treatment technology, among others.

From left, PhD candidate Nicholas Sperling; Toledo Radiation Oncology Physician Group members Dr. John Feldmeier, professor and chair of radiation oncology, Dr. Ishmael Parsai, professor and director of the graduate medical physics program and chief of medical physics, and Dr. Faheem Ahmad; and PhD candidates Xiance Jin and Bhoj Gautam.

NEWS FROM RITTER PLANETARIUM-BROOKS OBSERVATORY

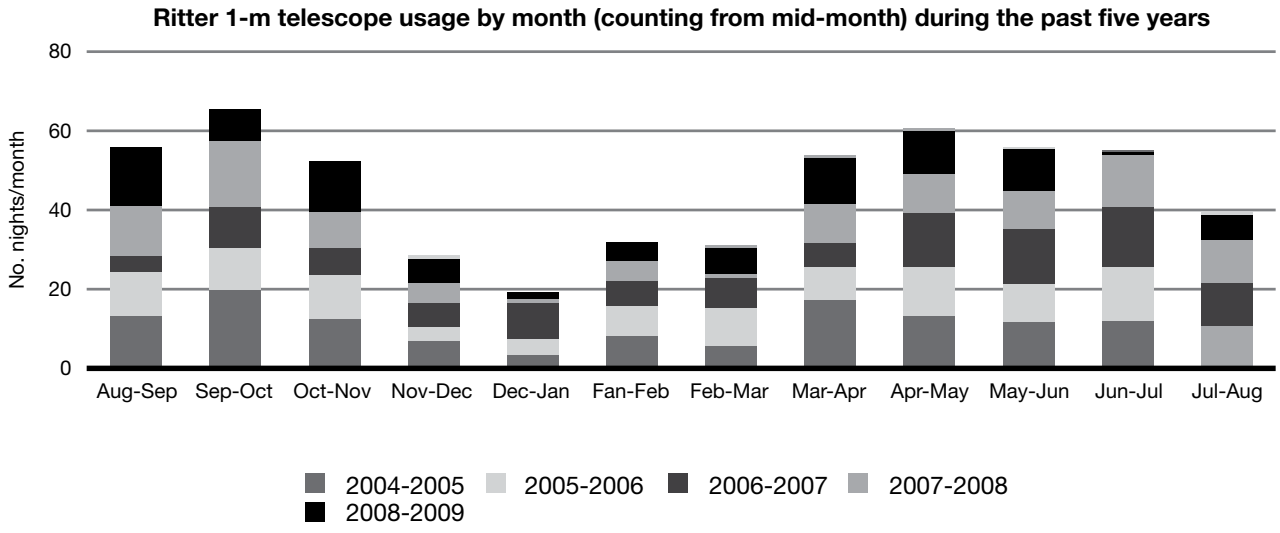
Ritter Planetarium offered its usual rotation of programs for the public and for school, scout, and private groups. In addition, we held a special series of popular lectures by UT astronomy faculty, the UT Astronomers' Lecture Series. We also participated in some of the national and international events organized through the International Year of Astronomy 2009: the Hundred Hours of Astronomy, Galilean Nights and the second of two NASA image unveilings. A special gallery for permanent display of the NASA images is planned. The planetarium received a small grant from the SEED Grant program of the Astronomical Society of the Pacific, "Ritter Observatory: Dusk to Dawn," for production of a planetarium show with that tentative title. In addition, the NSF CAREER grant received by **Prof. Rupali Chandar** includes significant funding for a major outreach activity with planetarium **Associate Director Alex Mak**.

On May 18, 2009, we held open house, including two presentations of "The Sky Gazer" and observing with the 1-meter telescope, for more than 100 attendees of the annual conference of the International Association for Great Lakes Research, held this year at UT in the Student Union and organized by a committee headed by Dr. Carol Stepien, director of the Lake Erie Center. Our programming was very well received.

On May 28, 2009, we hosted a team from Spitz Inc., who brought a demonstration unit of the Spitz SciDome HD system to show off its capabilities in our planetarium. The demonstration played to a nearly full theater, including University administrators, faculty, and students and members of the planetarium's Community Advisory Board. The demonstration made it plain that this system would be an excellent tool to enhance our efforts in astronomy education and public outreach, and it has capabilities of interest to other disciplines, as well. Fundraising to support purchase of this outstanding equipment is under way.

NEWS FROM RITTER OBSERVATORY

Ritter Observatory continued its research programs in spectroscopic monitoring of variable hot stars, as well as a suite of monitoring programs requested by external investigators under the auspices of our NSF-PREST grant. Service observing will continue even though the NSF grant expired during the year. Ritter is now part of the national, NSF-supported optical-infrared (O/IR) astronomy base program headed by the National Optical Astronomy Observatory (NOAO). More information can be found in the NOAO web pages (noao.edu).



RESEARCH EXPERIENCES FOR UNDERGRADUATES (REU)

The Summer 2009 NSF-REU program in Physics and Astronomy, directed by **Dr. Richard Irving and Professor Thomas Kvale,** gave enhanced research opportunities to 13 undergraduate students from nine colleges and universities in five states spread from coast to coast. Student participants were chosen competitively out of 116 applications from students in 34 different states in all regions of the U.S. **Casey Bennett** for the second time (as a new graduate of Northwood High School) and **Corbin Taylor** also participated unofficially in our REU program. **Casey** has since matriculated to Case Western University. **Corbin Taylor** is a sophomore in our Physics and Astronomy Department. All the participants were serious and talented young scientists, who tackled substantial problems, participating in all stages of a project, from formulation to conclusion, including oral and written presentations of results.

A weekly "Brown Bag" seminar series is an important part of our summer program. Faculty members and/or outside speakers are asked to present a talk over the lunch hour for the chosen day. This format fosters more of an informal atmosphere, which the students appreciate when it is their turn to give a presentation at the close of the summer session. This weekly meeting of the entire REU group also provides an opportunity to plan social events and field trips and discuss any topics of interest to the group.

Social activities were coordinated with the help of the following local participants: **Casey Bennett, Marina Kounkel, Lydia Michaels and Rosa Zartman**. **Lesley Simanton**, a 2008 REU participant, and a new graduate student in our department, also participated. Weekly activities included movie night on Mondays, sand volleyball, ultimate frisbee, late night board games, and various ventures to local restaurants. One of the notable establishments people found fun to visit was Sakura Japanese Steak House. The perennial favorite is a windsurfing adventure, courtesy of Professor Alvin D. Compaan at his solar hybrid home. Some of the other special events included frisbee golf, several BBQ's, a trip to Cedar Point Amusement Park and a Toledo Zoo visit. However, one of the more exciting (if not terrifying) of the social events this summer was sky diving at a facility in Xenia Ohio (*skydiveohio.com*). Eleven of the REU students participated in this experience. Each of the students performed the jump in tandem with a skydive instructor. The students can cross another one off their "bucket list".

As part of the REU program, the **Physics and Astronomy Summer Camp** outreach activity for high school students took place July 29-30. The summer camp activities were developed and performed with the help of our REU team. **Jackie Kane**, a St. Ursula high school science teacher, also had a large role in developing activities and recruiting students for the camp. The first day of the Summer Camp dealt with photovoltaics and the need for alternative energy in general and included a lecture and tour by **Professor Alvin Compaan** of his solar house, as well as hands-on activities involving solar cells and wind energy. The second day featured activities related to astronomy including presentations in Ritter Planetarium by **Professor Karen Bjorkman** and astronomy graduate student **Brad Rush**. Besides giving a tour of the One-Meter Telescope, **Professor Bjorkman** did a neat student activity on the scale of the solar system, which utilized the length of the University's Centennial Mall and the student campers as the planets. We had 21 high school students attend! Anthony Wayne, Perrysburg, Sylvania Southview, St. Ursula and Toledo Technology Academy high schools were represented.

Mentors and participant in 2009 Summer REU

Left to right (front row): Jim Walker, **Rosa Zartman, Rachel Gestrich, Stephanie Ash, Becky Carlson, Lydia Michaels, Catherine McGuinness, Marina Kounkel**

Left to right (second row): Uma Vijh, Rupali Chandar, Al Compaan, **Sean Maddock, Tyler Hill, Maverick Terrazas**, Michael Dennis, **Casey Bennett,** Bill Ingler

Left to right (back row): Dave Ellis, Tom Kvale, **Casey T. DeRoo**, Rick Irving, Adolf Witt

Many thanks to all the people who helped out during our NSF- REU, especially the office staff, Willie Brown, Sue Hickey and Stephany Mikols. A final thanks goes to the National Science Foundation. NSF's grant to The University of Toledo for the Research Experiences for Undergraduates made this summer program possible.

GRADUATE AND UNDERGRADUATE AWARDS CEREMONY

The Department of Physics and Astronomy's Ninth Annual Recognition Ceremony and Sigma Pi Sigma induction were held on April 28, 2009. The following awards were presented:

UNDERGRADUATE AWARDS

Elgin Brooks Memorial Astronomy Scholarship: **Marina Kounkel**

Chad Tabory Memorial Award for Outstanding Undergraduate Research in Physics and Astronomy: **Rachell Gestrich** and **Rosa Zartman**

C.V. Wolfe Scholarship in the Natural Sciences: **Kyle Bednar**

Physics and Astronomy Outstanding Graduating Undergraduate Student: **Ryan Zeller**

Physics and Astronomy Outstanding Service Award (Undergraduate): **Adam Gray**

GRADUATE AWARDS

Physics and Astronomy Outstanding Service Award (Graduate): **Michelle Sestak**

THE 2009 SIGMA PI SIGMA INDUCTEES WERE:

Thomas Allen
Rachell Gestrich
Marina Kounkel
Giridhar Nandipati
Amruta Nawarange
Victor Plotnikov

CONGRATULATIONS!

The following graduate students successfully defended their Ph.D. dissertations or received an M.S. based on a thesis or major peer-reviewed publication in 2009:

Dr. Jian Li, Ph.D.
Dr. Erica Hesselbach, Ph.D.
Dr. Himal Khatri, Ph.D.
Dr. Giridhar Nandipati, Ph.D.
Dr. Gregory Thompson, Ph.D.
Dr. Victor Plotnikov, Ph.D.
Dr. Adam Ritchey, Ph.D.
Dr. Anthony Vasko, Ph.D
Dr. Zhengdong Zhang, Ph.D.
John Royston, M.S.
Robert (Chip) Davidson, M.S.
Michael Brown, M.S.

In addition, the following graduate students successfully defended their Ph.D. dissertations in December 2008:

Dr. Dinesh Attygalle, Ph.D.
Dr. Chinthaka Liyanage, Ph.D.
Dr. David Pearson, Ph.D.
Dr. Jun Kang, Ph.D.

ALUMNI NEWS

JOHN P. WISNIEWSKI (Ph.D. 2005) has been awarded the 2009 Chretien International Research Award by the American Astronomical Society (AAS). His project is to establish a long-term collaboration with the Subaru Strategic Exploration of Exoplanets and Disks (SEEDS) project, focusing on the imaging of disks, a key program within the SEEDS project. John is currently a NSF Astronomy and Astrophysics Postdoctoral Fellow at the University of Washington (Seattle). He will be working with astronomers from Japan on a project involving the search for extrasolar planetary systems and circumstellar disks using the 8.2 meter Subaru telescope operated by the National Astronomical Observatory of Japan on the top of Mauna Kea, Hawaii.

FRED ESPENAK, former student of Prof. Emeritus Larry Curtis, is the co-author with Mark Littmann and Ken Willcox of the third edition of the book, "Totality: Eclipses of the Sun", published by Oxford University Press. Among other duties, Fred Espenak runs the NASA Eclipse Home page.

CONGRATULATIONS

Adam and Sarah Ritchey, welcomed a baby boy (Ewan Michael), born February 27, 2009.

Megan Schwenker Smith gave birth to a healthy baby girl (Tessa Elizabeth) on March 12, 2009.

Michelle and Mike Heben welcomed a new baby girl (Eleanor Joan) into the world on April 1, 2009.

Uma and Aarohi welcomed a baby girl (Maya Iyer Vijh) into the world on December 17, 2009.

Sue Hickey welcomed a granddaughter (Lillian Fay Hickey Sifuentes) born April 1, 2010.

IN MEMORIAM

Indrek Martinson, emeritus professor and director of the Institute of Atomic Physics at the University of Lund Sweden and adjunct professor at The University of Toledo and long-time collaborator of Prof. Larry Curtis, passed away November 2009.

Oleg Polomarov, Ph.D. 2005, passed away November 2009.

THE UT ENDOWMENT FUND CAMPAIGN

Alumni and friends of the Department of Physics and Astronomy are urged to remember our department and college as they consider giving and pledging. The department has several established funds, some of which are endowed and others may not yet be endowed. Other funds may have dipped below the threshold required by the UT Foundation for returning spendable earnings that can be used, for example, for scholarships, honoraria for speakers, etc.

JOHN J. TURIN MEMORIAL FUND

Established to honor former department chair and dean of the Graduate School, John J. Turin. He was integral in building UT's first Ph.D. program in the 1960s. This endowment funds annual awards to physics students, based on merit (3.5 GPA or higher).

CHAD TABORY OUTSTANDING UNDERGRADUATE RESEARCH FUND

This account, founded in memory of Chad Tabory, a UT physics graduate and research lab technician, funds the outstanding undergraduate research award.

RITTER OBSERVATORY PUBLICATION FUND

This fund helps to support the cost of publishing the Ritter Observatory annual report, as well as student papers when possible.

REACH FOR THE STARS FUND

This account has recently been established to begin an endowment that will be used to support the buy-in to an international telescope consortium and ancillary activities. This is a major goal of the department.

THE PLANETARIUM PROGRESS FUND

The purpose of the Planetarium Progress Fund is to hold the subscription donations of the Friends of Ritter Planetarium and all other gifts in support of our astronomy outreach programming. All funds are used for large capital expenses and the growth of an endowment portfolio, the interest from which will help cover operating expenses.

PHYSICS AND ASTRONOMY FUNDS FOR EXCELLENCE

The Funds for Excellence supports scholarships and fellowships, acquisition of research equipment, special colloquia, etc. which are so essential for departmental excellence.

SIGMA XI DION D RAFTOPOULOS OUTSTANDING FACULTY RESEARCH AWARD

This is a perpetual memorial in honor of Dion D. Raftopoulos for support of the Sigma Xi Award for Outstanding Research at UT. This award remains one of few awarded by the faculty to peers in recognition of their outstanding contributions to the research enterprise at the UT. We are proud to note that 12 of the total 30 winners of this award through 2005 have been from the Department of Physics and Astronomy.

The UT ALUMNI ASSOCIATION wants to hear from you. Check out their web site at *toledoalumni.org*. Please join the movement.

Department of Physics and Astronomy
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