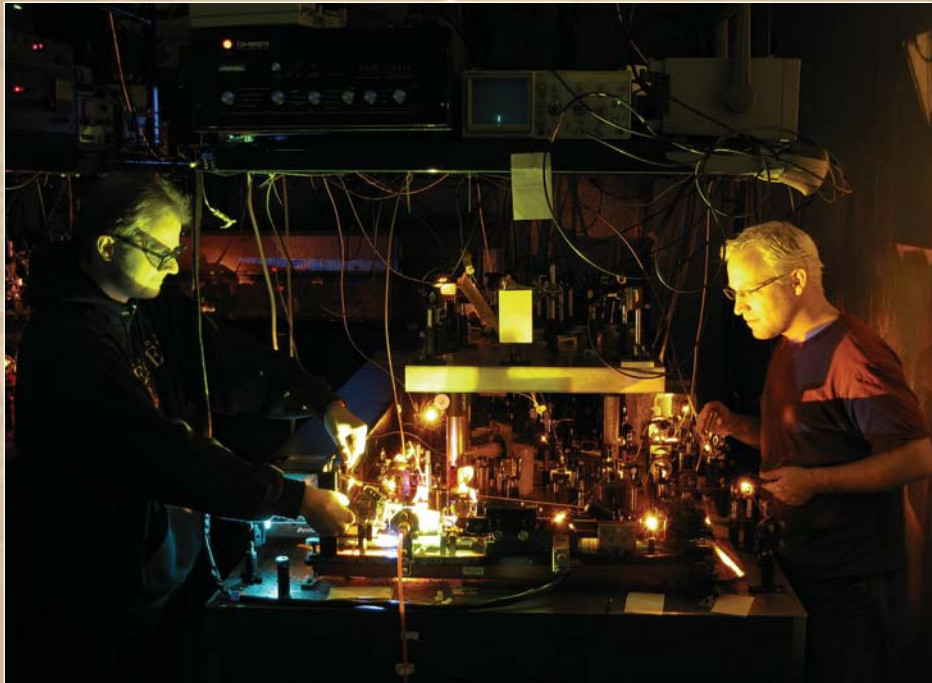




Cross Sections



DEPARTMENT OF PHYSICS AND ASTRONOMY
UNIVERSITY OF ROCHESTER
SPRING 2006



Message from the Chair

—Arie Bodek

The Board of Trustees recently chose a new president for the University of Rochester: J. Seligman. Our own Nick Bigelow chaired the faculty committee that conducted this search.



Several of our faculty, students, and alumni have received awards during this past academic year. I will only mention a few and refer you to news stories on our department Web page for the others.

Professor Joe Eberly has been serving as vice president and president elect of the Optical Society of America and will become president in 2007. Assistant Professor John Howell was awarded the Presidential Early Career Award for Scientists and Engineers (PECASE) in 2006. Professors Eric Blackman, Kevin McFarland, and Lynne Orr were named fellows of the American Physical Society in 2005.

Maria Florencia Canelli (Ph.D. '04) was awarded the American Physical Society's 2005 Mitsuyoshi Tanaka Dissertation Award in Experimental Particle Physics for her 2003 Ph.D. dissertation as a University of Rochester student. Young Kee Kim (Ph.D. '90) was awarded the most prestigious Korean Science Prize in 2006 and will assume the post of Deputy Director of Fermi National Accelerator Laboratory in 2006. She has also been serving as co-spokesperson of the CDF collaboration at Fermilab.

We wish to take this opportunity to thank all our friends who have contributed so generously to the support of the department. By completing the form on the last page of our newsletter, you can continue (or begin) that tradition of giving that will assure the future excellence of the department. Other ways to help our cause are to inform any promising students about our summer undergraduate research program (REU) and to encourage students interested in careers

in physics or astronomy to apply for graduate study at Rochester. Application material for all these programs is available on our Web pages (www.pas.rochester.edu). If you know of any exceptional undergraduates whom we should consider either for our REU program or for graduate studies, we would appreciate it if you would please send their names and e-mail addresses to Barbara Warren (barb@pas.rochester.edu), and we will contact them directly. Any help from our alumni along these lines would be greatly welcomed. Several years ago, the University initiated a tradition of hosting yearly Meliora Weekend reunions (see www.rochester.edu/alumni). I encourage all our alumni and friends to come and visit us in fall 2006. For the latest news about the department, please visit our Web page, where you can also find the current and several recent issues of Cross Sections online.

Cross Sections

Editors: S. Rajeev and R. Demina

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To catch up with the happenings at the University, log in to www.pas.rochester.edu and find the latest news. For previous editions of this newsletter, go to the Alumni and Friends page from the Home section. Or point your Web browser to <http://spider.pas.rochester.edu/mainFrame/home/alumni.html>.

—Webmaster, Steve Teitel

On the Cover

Chris Haimberger (right) and Jan Kleinert (left) adjust one of the more than 10 laser systems that they use to control the creation of ultracold heteronuclear molecules in Nick Bigelow's quantum optics laboratory. Using these lasers, sodium and cesium atoms are first cooled to micro-kelvin temperatures. From the cold atomic vapor, diatomic heteronuclear molecules are formed when photons from a separate laser photoassociate atomic pairs into bound molecules. The resulting molecules are probed a pulsed dye laser and detected by time-of-flight mass spectrometer. The yellow light in the foreground is the ring dye laser used to trap the sodium vapor. In 2005, this Rochester team was one of four groups in the world to create such cold polar molecules using an all-optical approach.

Important notices: Department phone: (585) 275-4344 and fax: (585) 273-3237.

If you change your mailing address, please contact Bob Knox with your new whereabouts (rsk@pas.rochester.edu). Also let him know your current e-mail address.

Phase Change in Fluids Finally Simulated after Decades of Effort

Everyone knows what happens to water when it boils—everyone, that is, except computers. Modeling the transformation process of matter moving from one phase to another, such as from liquid to gas, has been all but impossible near the critical point. This is due to the increasingly complex way molecules behave as they approach the change from one phase to another. Yonathan Shapir, Eldred Chimowitz, and Subhranil De have now created a mathematical model that will allow scientists to simulate and understand phase changes, which could have an impact on everything from decaffeinating coffee to improving fuel cell efficiency in automobiles of the future. The findings have been published in *Physical Review Letters*.

“This problem has baffled scientists for decades,” says Yonathan Shapir, professor of physics and chemical engineering and coauthor of the paper. “This is the first time a computer program could simulate a phase transition because the computers would always bog down at what’s known as the ‘critical slowdown.’ We figured out a way to perform a kind of end-run around that critical point slowdown, and the results allow us to calculate certain critical point properties for the first time.”

“Critical slowdown” is a phenomenon that happens as matter moves from one phase to another near the critical point. As molecules in a gas, for instance, are cooled, they lose some of their motion but are still moving around and bumping into each other. As the temperature drops to where the gas will change into a liquid, the molecules’ motion becomes correlated, or connected, across larger and larger distances. That correlation is

a bit like deciding where to go to dinner—quick and easy with two people, but takes forever for a group of 20 to take action. The broadening correlation dramatically increases the time it takes for the gas to reach an overall equilibrium, and that directly leads to an increase in computing time required, approaching infinity and bogging down as the gas crosses the point of phase change.

To illustrate the effect, imagine a perfectly pure and still lake. If you drop a pebble into this lake, its ripples would spread outward, dissipating until the lake had returned to a calm equilibrium again. But if you were to take this impossibly perfect lake just barely above the critical point and drop your pebble, the ripples would remain as ripples much longer—likely bouncing off the distant shores. This imaginary lake would take seemingly forever to return to its calm equilibrium again.

The research team of Shapir, Eldred Chimowitz, professor in the Department of Chemical Engineering, and physics graduate student Subhranil De created a novel approach to tackle the phase-change process. They devised a computational model consisting of two separate reservoirs of fluid at equilibrium and near the critical point threshold. One reservoir was slightly more pressurized than its neighbor. The reservoirs were opened to each other, and the pressure difference caused the fluids to mix. The team let the simulation run until the entire system reached thermodynamic equilibrium. By watching the rate that equilibrium returned, the team was able to calculate the behavior at the critical point. Their simulation findings match predictions and experimental

results, including very precise measurements performed in microgravity on the Space Shuttle.

“In principle, it’s a difficult calculation,” says Chimowitz. “Fluid systems require a different class of models than the common lattice models used by researchers who have studied dynamic critical behavior. These different classes give rise to different dynamic critical exponents, and we found them, for the first time, in real fluid systems.”

The best known examples of phase changes are perhaps water to ice and water to steam. Phase changes of many different physical types occur, however, such as the separation of a liquid mixture to its components, which should also abide by the Rochester team’s results.

The team’s simulation approach will likely be used by industry in a variety of ways, not the least of which will be to derive more power from a fuel cell. Since fuel cells rely on the transportation of protons through a membrane separating two electrodes, Shapir and Chimowitz believe it should be possible to use their work to find the most efficient configurations for a fuel cell. Other applications, such as removing the caffeine from coffee, work in a similar way and will likely also benefit.

Chimowitz also has just published a much-praised book about the subject, *Introduction to Critical Phenomena in Fluids* from Oxford University Press. The book has been nominated for the Association of American Publishers’ Award for Excellence in Professional and Scholarly Publishing.

This research was funded by a grant from the National Science Foundation.

Amnon Harel—the New Marshak Fellow

Would you take the money or the interesting job?

That's the question our newest Marshak Fellow, Amnon Harel, formerly of Wuppertal University, faced years ago when he decided to give up a career in computing and study physics. "I was a bit worried about it, because I have absolutely no talent in all my favorite hobbies: basketball, music, and bridge. What if physics was another thing I just liked but shouldn't take too seriously?" But the lure of finding the nitty gritty details of how our world really works was too much, and after Amnon finished his B.Sc. in the Israeli Institute of Technology Excellence program, he joined the High Energy Physics group of the Technion—Israel Institute of Technology. There he cut his teeth measuring how fast matter-antimatter oscillate in B_s meson-system using data collected by the OPAL detector at CERN's Large Electron Positron (LEP) collider. This was a daunting task since even with the time dilation afforded by their great speed, they oscillate at least twice per picosecond or roughly once per millimeter.

Amnon joined the Technion's efforts in designing and building a detector control



Amnon relaxes with his daughter Gali.

system for the ATLAS experiment's forward muon trigger chambers. ATLAS is one of the two major all-purpose detectors being built for CERN's Large Hadron Collider (LHC), which is scheduled to provide the world's highest energy and luminosity for the next decade. The trigger chambers provide fast sign-

als crucial to selecting which of the 30 million events per second should be stored for later physics analysis.

For the sake of speed, these events are processed by dedicated computers located on the detector. It also requires a highly flexible design with many configurable parameters controlled by the system. All of these variables make the control system's task more interesting as the high radiation levels in the forward parts of the detector randomly corrupt both the data and the programs on the onboard computers.

Having joined the high-energy frontier in Fermilab's D0 experiment, Amnon is currently searching for new particles related to the top quark, which may be lurking in the "standard" top samples. With the larger data sets and improved analysis techniques now available at D0, such particles may be appearing directly as mass resonances. They may also leave a distinct footprint of extra jets produced together with the top-anti-top pair, and Amnon is working on measuring the production of such extra jets in the "golden" channel, where one of the top quarks decays into an electron or a muon.

On Argentine Connections

Since Tom Ferbel had never visited Argentina, when a possibility came up to speak at a conference at the Centro Atomico in San Carlos de Bariloche in January 1998 and nobody from the DZero experiment was interested, he decided to finagle an invitation and lecture the gathered theorists on the physics of the top quark. During lunch on the first day of the meeting, Tom asked the late Luis Masperi, then director of the Instituto Balseiro, whether there were any students at the center interested in experimental physics. Luis thought about this and suggested that he speak with Luis's own brilliant theory student Juan Estrada, who had just finished his master's thesis on astrophysics. Luis felt that Juan was sufficiently unusual to be smitten by the idea of working with us at Fermilab. Within the next three years, Juan was

accepted to the Rochester graduate program, finished his courses and all his exams, and completed his Ph.D. He became an expert on properties and electronics of solid-state, light-sensitive photon counters ("VLPCs" designed by Rockwell for the DZero experiment) and started developing with his former countryman Gaston Gutierrez of Fermilab a new method for extracting parameters from collider data (based on a direct comparison of data with a matrix element for the process in question). In the following two years, as a postdoctoral researcher at Fermilab, he continued to hone his skills in analog electronics and figure out how to increase the luminosity of the Tevatron by about 30 percent. He received the first Alvin Tollestrup URA prize for best research by a postdoc at Fermilab and an early career

award from the IEEE, became a Wilson Fellow at Fermilab, and published his best measurement of the mass of the top quark in *Nature* (the first-ever publication in *Nature* of a result in high-energy physics from research based at accelerators!). Juan is now working on a detector to study the dark energy in the universe.

Florencia Canelli was the next connection to Argentina. She too had worked at Centro Atomico but was studying at Buenos Aires with Ricardo Pegaia. She was starting her thesis at Fermilab, when they ran out of support for her in 1998. Juan suggested to her that she approach our group. She too passed her exams in a hurry and became an expert on display software. She then worked with Juan and Gaston in their development of the "matrix-element" analysis package and followed in Juan's footsteps to work on

a problem in top physics as her thesis. She measured the spin properties (helicity) of W bosons emitted in decays of top quarks. Her beautiful thesis garnered her recognition from the Erice School, where she won the C. S. Wu prize for her novel analysis. In 2004 she received the URA/Fermilab prize for best thesis at Fermilab, and this past year she won the DPF/APS Mitsuyoshi Tanaka Award for best thesis in particle physics. Currently a postdoc for UCLA on the CDF experiment, she is looking for an assistant professorship position in particle physics.

The next Argentine connection, Ricardo Eusebi, flew in below DZero's radar screen and wound up at CDF. Ricardo has been interested in the possible decays of top quarks to charged Higgs bosons, which would offer evidence for the existence of supersymmetry. He has made vital contributions to the CMS LHC detector. Ricardo defended his thesis in November 2005 and has accepted a Research Associate position at Fermilab.

The latest (but hopefully not last) connection to the Centro is Carlos (Charly) Garcia. He too became an expert on VLPC

detectors and has applied the matrix element approach to searches for standard Higgs bosons. He plans to outdo Juan in a new measurement of the mass of the top quark for his thesis, again with help from Gaston, who is now the head of the top group at DZero.

So the moral of the story is, when you get an opportunity to visit some beautiful out-of-the-way place on earth, you should do it, because you never know what that will lead to!

EDUCATION

Passing the Prelim . . .

By Julia Langenbrunner

Much of the time that students spend studying for the Preliminary Examination in Physics is actually spent on figuring out *how* to study for the Preliminary Examination in Physics. The following is a summary of what the collective experience of physics graduate students has taught us about this beast known as the Prelim.

The best approach to studying for this one is the same as for any physics exam: work problems. Get yourself copies of past prelims (and solutions, too, if possible)—though these should be used with caution) and run with them. Be sure to talk to professors and other students (these were my greatest sources of help). Often, there are books filled with practice problems in the offices of grad students who have already passed the prelim. They're probably not using them anymore, so go borrow them. You will most certainly have to revisit and review the theory while you go through the problems, but try to let the problems direct your studying. This will help you use your time most efficiently. At this point there have been enough prelims in the past that we have a good sample of problems. Take stock of which types show up often and which types do not. If the Wigner-Eckert Theorem, for example, only shows up once, don't waste a week trying to learn it if you haven't already. Focus first on ideas that you have a good chance of seeing on the exam—things like the

Simple Harmonic Oscillator in Quantum and separation of variables in E&M. On the other hand, if there are whole sections that you have never understood to begin with, though you tried your hardest, it might be advisable to just forgo them completely (though this can often be risky). I, for example, never understood time-dependent perturbation theory when I was supposed to be learning it in class, and since I could not find "Time Dependent Perturbation Theory for Dummies" at Barnes & Noble, I cut my losses and focused on the other biggies.

In conjunction with working problems, the best thing you can do for yourself is form a study group with the other students who are taking the prelim. One study group that I know of with a 100 percent success rate laid down rules, almost as if it were a fraternity. In addition to their individual studying, these students met twice a week during the fall semester, and nearly every day for the last two weeks before the mid-January prelim. If anyone skipped a meeting, that person owed all the others pizza. Study groups such as this one are helpful for two main reasons. First, it's much harder to slack off when you know there are people depending on you to show up (and even harder if you know you'll owe them pizza). The other reason is obvious—physics students survive best in packs. Often, one student is no match for these problems. It's better to sneak

up on them with three or more students, attacking from all sides.

I would also recommend that as you study, make note sheets. Do you understand separation of variables? Write it up as concisely as possible. If you need a little review later, it's often easier to get it from notes that you produced yourself, rather than notes from class. Try to include the equations that you need for application, and if you know, write down how to derive them. After all, we will be much more able to produce equations on demand if we know where they came from.

Finally, it has been my experience that half the battle is psychological. When I first started studying, which was about six weeks before the September prelim, I was sure I couldn't pass. This is, unfortunately, how most students feel when they first sit down to study, despite the fact the majority of students do actually pass. Usually a week or two is spent just staring at the wall, worrying about whether the possibility of passing even exists. The turning point usually comes because students get tired of worrying and realize that all they can do is do all they can (or, if you prefer Bob Dylan, "keep on keepin' on"). Essentially, they convince themselves that they can indeed pass, even if, subconsciously, they're not sure. The uphill battle is really just finding a sincere desire to do your best. The sooner you reach that point, the easier the process will be and the better off you will be.

Research Experience for Undergraduates

By Connie Jones

The department just completed its 12th Research Experience for Undergraduates Program funded by the National Science Foundation. We are increasingly convinced of the importance of research to the genuine learning that enlivens undergraduate education. The experience of “doing” physics expands students’ understanding far beyond the textbook level, and it is the only form of training recognized as valid in becoming a physicist. Mentoring by faculty members, graduate students, and peers—an integral part of this experience—takes place through day-to-day interactions in offices and laboratories as well as through more formal scientific activities, such as the writing, presentation, and publication of research reports. Each student takes part in research in subfields such as particle and nuclear physics, quantum optics, condensed matter, biological physics, plasma physics, astrophysics, geo- and environmental physics, and physics education. Each week students attend informal talks by REU faculty mentors and thus are exposed to the variety and commonality of research among different subfields.

The number of applicants to the program has grown to roughly 200 per year.

From 1994 to 2005, about 200 undergraduates were supported fully or in part by the NSF-REU Site funds. The total number of undergraduates who have participated in Rochester’s Physics REU activities (including all funding sources) is about 360.

In the same period, 37 high school teachers participated in the REU Site activities. Eleven teachers were supported fully or in part by NSF RET (Research Experience for Teachers) funds, and of this group, seven participated in the RET program after involvement in the PARTICLE program (www.pas.rochester.edu/~particle).

The NSF-REU Site awards have provided full funding for 10–12 students per year. NSF funds have been leveraged using supplemental funding from other sources to support more than 20 undergraduate REU participants per year. The majority of our REU Site project funds have supported undergraduates from institutions other than Rochester. On average, 10 students per year have come from other institutions.

A recent e-mail from those that are on the panel awarding NSF fellowships for graduate students states, “Research experiences that extend beyond the applicant’s own campus can indicate

breadth of interest and motivation.” Rochester students are participating in REU programs at other institutions in increasing numbers. For instance in 2004, University of Rochester students were at Los Alamos, Lawrence Berkeley Lab, Brookhaven Lab, North Carolina State, and Texas. That summer a total of 16 Rochester majors participated in research programs. In summer of 2005, Rochester students did research at Boston University, Indiana, Michigan State, Northern Arizona, Caltech, Wisconsin–Madison, Cornell, NIST, Michigan, Stanford University, and Florida among others. A total of 25 Rochester physics majors were engaged in research. These students speak positively about the University to their peers as well as leave a positive impression with the faculty at other institutions, which enhances our reputation and may lead to applicants for undergraduate or graduate education. Rochester students are often encouraged to apply to the graduate program at those institutions. Seven of our current graduate students were REU students with Rochester as undergraduates attending other institutions.

We have just received funding from the National Science Foundation for another three years to continue the REU program.

HONORS AND AWARDS

APS Fellowships

The American Physical Society (APS) honored three Rochester physicists for their accomplishments. Election to APS fellowships is recognition by one’s peers of outstanding contributions to physics, and is limited to no more than 1/2 of 1 percent of the membership. The following names and fellowship citations were published in the March 2006 issue of *APS News*.



McFarland

Eric Blackman was recognized for identifying and elucidating fundamental principles

of nonlinear magnetic dynamo theory and for contributions toward understanding magnetic fields in a range of astrophysical plasmas.

Kevin S. McFarland was cited for his precision studies of the weak interactions of high-energy neutrinos.



Orr

Lynne H. Orr was honored for contributions to the phenomenology of the top quark and studies of gluon radiation in top quark production and decay.

More Honors

- Physics sophomore Robert F. Penna named a 2005 Barry M. Goldwater Scholar
- Robert Forties (B.S. '05) wins NSF Graduate Fellowship
- Andrew Collette (B.S. '04) awarded DOE Fusion Energy Science Fellowship
- Graduate student Phay Ho awarded 2005 Agnes M. and George Messersmith Fellowship
- Kam Wai Clifford Chan awarded the Croucher Foundation Fellowship {old news?}

Blackman Selected to Join the National Defense Science Study Group



Eric G. Blackman has been selected to join the Defense Science Study Group (<http://dssg.ida.org/>), which is part of the Institute for Defense Analyses. The DSSG selects young professors from many of the nation's top universities as well as nonuniversity-affiliated men and women, all of whom have been nominated by senior academic officials; DSSG alumni, mentors, and advisors; and other officials from various government agencies to take part in DSSG. Over the course of the two-year program, those invited focus on defense policy; related research and development; and the systems, missions, and operations of the armed forces.

John Howell Receives Presidential PECASE Award



The Department of Physics and Astronomy is pleased to announce that Assistant Professor of Physics John Howell has been named a recipient of a 2004 Presidential Early Career Award for Scientists and Engineers (PECASE). This prestigious award, for young faculty at the start of their careers, will provide John with \$500,000 support for research, spread out over a five-year period.

The 2004 awardees received a private tour of the oval office, followed by a ceremony in the cash room of the Treasury Department. The photograph shows them in front of the White House with President Bush. John is seventh from the right in the top row.

Su-Jung Park Receives German National Academic Foundation Fellowship

Graduate student Su-Jung Park, who is working toward her Ph.D. degree in experimental particle physics with Professor Regina Demina, has been awarded the prestigious Studienstiftung des deutschen Volkes (German National Academic Foundation) fellowship. Su-Jung will receive this scholarship for the next two years (2005–2006 and 2006–2007).

Faculty Build Bridges to New Fields

A select group of faculty will venture from the relative comfort of their academic specialties to explore new territory this college year. As a bridging fellow, astrophysicist Adam Frank is teaching and discussing the intersection of science, myth, and religion. Proposals by Frank, professor of physics and astronomy, and Jeff Tucker, associate professor of English, describe their desire to flesh out ideas for projects conceived years ago. Frank plans to write a book for popular audiences on science and myth.

"Regardless of their level of education, many people say they want to know what science tells us about where we came from, where we are going, and who we are," Adam says. While working with students and faculty in the Department of Religion and Classics, Adam will continue his study of how science functions as myth "by providing an aether of ideas, concepts, and, most important, stories through which we all move with varying degrees of awareness."

A Tribute to Emil Wolf

A Tribute to Emil Wolf: Science and Engineering Legacy of Physical Optics honors Emil Wolf and his career. The many contributors to the book, former



collaborators and colleagues, highlight Emil's research, contributions, and influence in the field of optics.

A review in *Optics and Photonics News* (www.osa-opn.org)

states, "This handsomely bound book presents the proceedings of the SPIE August 2003 tribute conference for Emil Wolf, who is one of the truly grand old men of optics."

Govind Krishnaswami Wins Marie Curie Fellowship

Govind Krishnaswami (Ph.D. '04), currently a postdoctoral associate at the Spinoza Institute and the Institute for Theoretical Physics of Utrecht University, the Netherlands, and formerly a student in the Department of Physics and Astronomy, has been awarded the prestigious Marie Curie Fellowship by the European Community.

Mandel Fund

We are in the beginning of the third year of fundraising for the newly formed Leonard Mandel Endowment Fund. The fund is continuing to grow. We have now reached the \$125,000 mark out of the \$500,000 we hope to raise. Please use the form in the back of *Cross Sections* to send in this year's gift.

Young-Kee Kim Awarded Korean Science Prize and Appointed Deputy Director of Fermilab

As a doctoral student, Young-Kee Kim (Ph.D. '90) worked on the AMY experiment (with Olsen and Bodek). Now a professor at the University of Chicago, she traveled to Korea to receive the Ho-Am Prize (the most prestigious prize in Korea). There are five winners each year: one each in science, engineering, medicine, arts, and community service.

In July 2006, Young-Kee will assume the position of deputy director of Fermi National Accelerator Laboratory. Her overall goals: "To keep the lab



a great place and a safe place to work, a great place for science, and a great place for the public that supports us."

Professor Arie Bodek Named George E. Pake Professor of Physics

The University Board of Trustees, at their recent meeting, honored Arie Bodek, Professor of physics and chair of the Department of Physics and Astronomy, with appointment as the first George E. Pake Professor of Physics effective March 1, 2005.



Peter Knight Awarded Knighthood

Professor Peter Knight, Head of Physics at Imperial College, London, and former Rochester research associate in quantum optics (with Professor Joseph H. Eberly), was knighted in Queen's birthday honors.

OTHER DEPARTMENT NEWS

Sports and Recreation

By Sergey Korjnevski and Joe Eberly
Convenience and leisure of contemporary life lead however to a big problem—danger of physical inactivity. And while a modern man can afford a couch, a TV set, and a 12-pack, this hitch is seriously big. Many of us realize that and try to live an active life, joining a health club, recreational sport league, or exercising on our own.

Looking at our department, the situation is disappointing—too few of us appear to be exercising regularly. Out of 170 people in the department, including faculty, staff, and graduate students, how many among us do more than walk back and forth to our cars? For example, barely more than 30 use the University of Rochester's sports and athletic facilities, which are really nice, closely located, and very inexpensive, especially for students. Some people most likely work out on their own in parks, basements, garages, or health clubs. Even if we are two times off, that will make only about 60 active people in

the department. Therefore, we'd like to give a short description of the sports life in the department and list different possibilities for those who may be looking to start or restart recreational sports in their lives.

Most popular is the physics and astronomy soccer club. This group is recognized and partly supported by the University athletics and recreation department. Currently, the alliance meets three times a



Members of the PAS running club before Rochester Marathon, September 2005. Paul Tipton, Martino Vaglio (medical engineer), Regina Demina, Sergey Korjnevski

week—Monday and Wednesday at noon and Saturday at 10 a.m. to play friendly, noncompetitive slow-paced games of soccer. Active players include Professors Manly and McFarland; grad students Ivan Minchev, Julie Langenbrunner, Matt Lijoi, Elizabeth Groves, Justin Camparetta, Chris Haimberger, and Brian Winey; staff members Steffin Spears, Sergey Korjnevski, and others. This group always welcomes new players and is open to anyone from other University departments as well as family members, age 7 and up.

Another popular activity is basketball. There are a few enthusiasts in the department. This sport is quite popular at the University with regular full-court pickup games on the Palestra floor in the Goergen Athletic Center at noon on Mondays, Wednesdays, and Fridays. Professors Blackman and Eberly can be found among the players.

Ice hockey is one of the favorite sports in Rochester, and in the department we currently have a number of active players,

including David Clader, Marat Khafizov, Ben Pearson, and Sergey Korjenevski. Anyone who is interested can join the University faculty hockey club to skate every Wednesday morning at Genesee Valley Ice Arena or come to Skate and Shoot at lunchtime at the same place.

But perhaps the most democratic athletic activity is represented by the



Running indoors at the University Field House: Paul Tipton, Adam Frank, Stanley Wilder

PAS jogging club. Started about 3 years ago by Professor Tipton and graduate student Sarah Demers, this club activity provides a good way to socialize as well as just

simply feel better. These workouts are about three to four times a week; the pace

is around 9 min./mi., and distances range from 3 to 5 miles. The most active members are professors Demina, Frank, Manly, and Tipton. Last September this group participated in, and finished, the inaugural Rochester Marathon. Other people who run regularly for recreation in the department are professors Cline, Helfer, Thomas, and Watson as well as Thang Nguyen and Sue Brightman.

Within the department there is company waiting for participants in an interesting variety of less conventional activities. Tennis is not as popular in the department as it probably should be, but regular players are Harry Fulbright, Steffin Spears, Ivan Minchev, and Steve Manly. There are serious swimmers, Lynne Orr and Susumu Okubo, and a member of the University fencing team, Daniel Berdine. Further away from campus one may spot longtime soaring master Doug Cline or on the numerous scenic trails for bicycling encounter



Professor Manly is in his favorite position playing soccer.

Nick Bigelow, Eric Blackman, Shirley Brignall, Bill Forrest, John Howell, or Dave Rainwater, who often spend their weekends riding.

For the future there are suggestions to engage (challenge?) department undergraduates in games of basketball and soccer. The idea of a supplemental sports Web page was recently discussed, and when created it will reflect what's new in the recreational and sports life of the department.

ALUMNI AND OTHER NEWS

Thank You

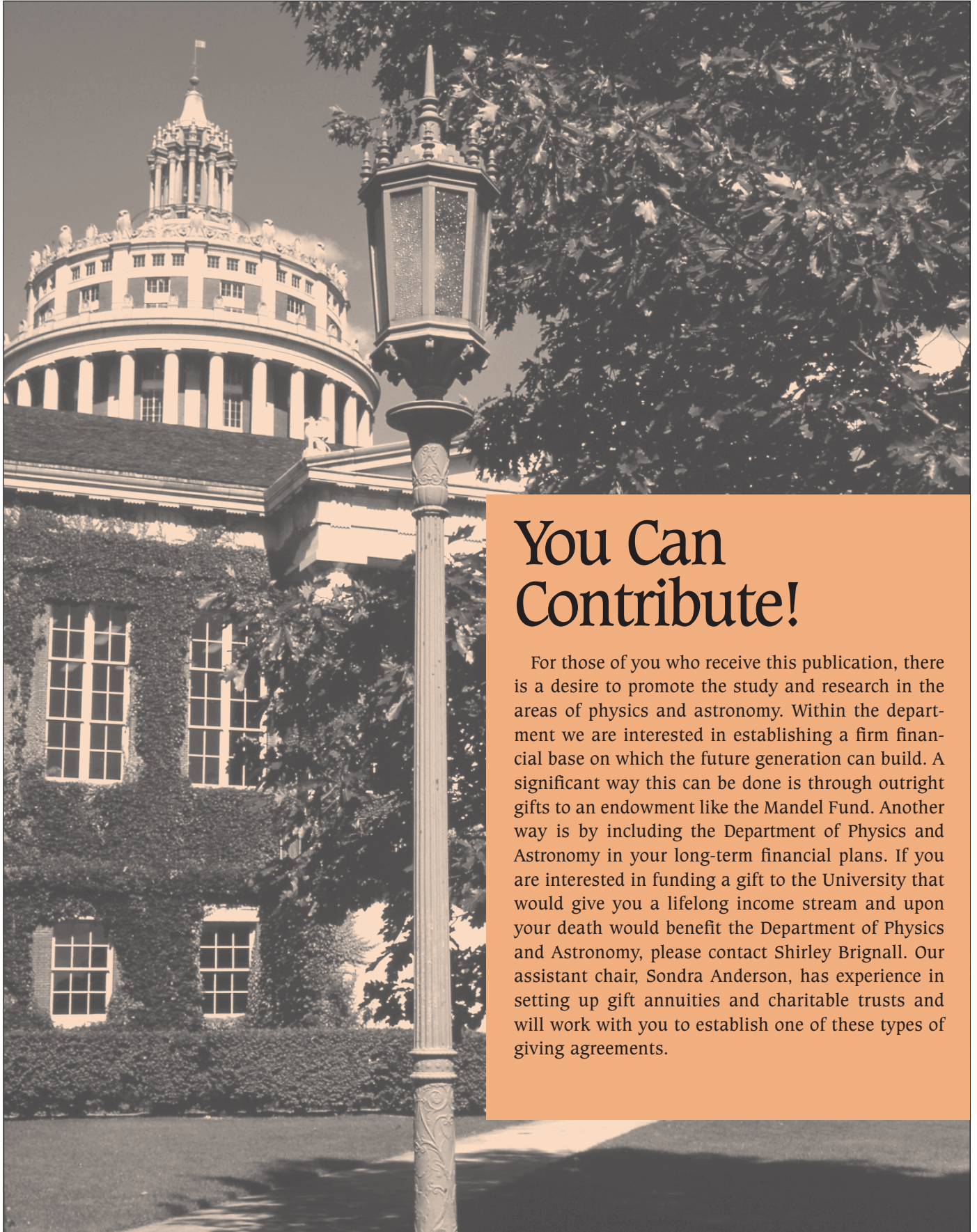
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