PHYSICS
A UNIVERSITY EXEMPLARY DEPARTMENT

1999/2000
Vol. I, Issue 1

Quanta

A publication for the faculty, staff, students, alumni & friends of the Virginia Tech Physics Department

Dr. Lay Nam Chang
Professor, Dept. Chair

Dr. John Ficenec
Professor, Assoc. Chair

Mrs. Janet Sanders
Dept. Business Manager

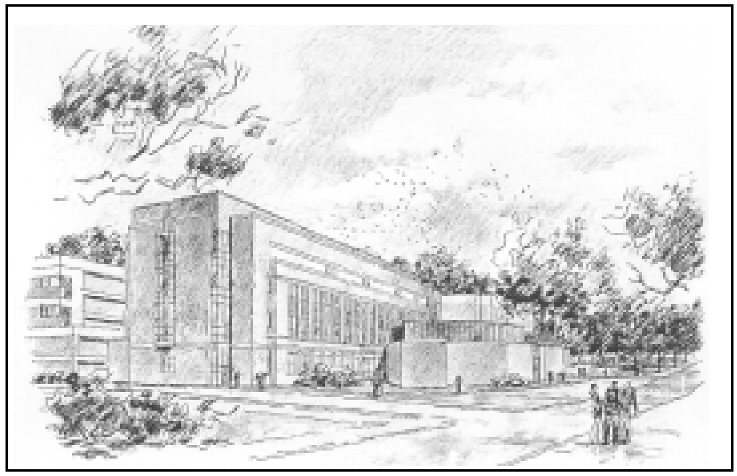
Mr. Ross Perkins
Newsletter Editor

Dr. Tatsu Takeuchi
Photography

New Chemistry-Physics Building Planned

The new chemistry/physics building came one step closer to completion this spring when the Buildings and Grounds Committee of the Board of Visitors conceptually approved a revised schematic design as presented by Clark Nexsen architects.

Located on West Campus Drive, the new building will be attached to Hahn Hall with a commanding view of the Duck Pond. The project, which has been approved by the state for $25 million, will address space and laboratory issues for both the physics and chemistry departments. Both departments also need expanded research facilities.



The new Chemistry / Physics building will be parallel to West Campus Drive, right across from the Duck Pond.

Dr. Lay Nam Chang, Physics Department chair, said that he has been looking forward to the new building for quite some time. "We have had to be patient, but the building comes at the right time for us. With an increased number of students from many disciplines taking physics, we are quickly running out of space to house lectures,

Continued on Page 7

Department Shows Excellence in Integrating Research with Undergraduate Education

Receives University Exemplary Department Award

President Torgersen (right) congratulates Dr. Chang during the Exemplary Award reception.

Within the Physics Department's mission statement is the assertion that "research in a university physics department plays a direct role in the education of undergraduate students . . . . Indeed, research forms the foundation upon which all higher education in the sciences rests." This year the university recognized the degree to which the Physics Department actually implements the conviction laid out in the mission statement by designating it as an *Exemplary Department*.

The theme of this year's Exemplary Department Award was "effectively linking research and teaching, with a particular concentration on innovative undergraduate programs."

"We are of course very honored to receive this award," said Dr. Lay Nam Chang, Physics Department chair. "I'm pleased to represent a group of hardworking people who care very deeply

Continued on Page 7

Dr. Dale Long - A Man with a Mission

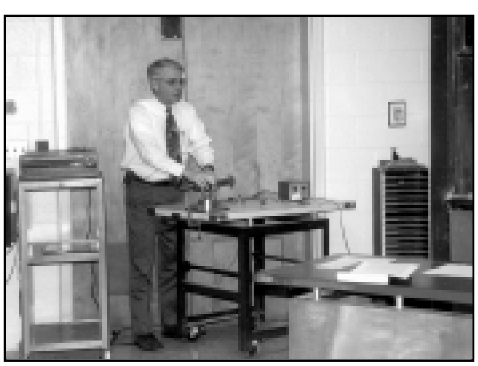
After 33 years of teaching at Virginia Tech, Dr. Long retires

The saying "never say never" has been around a number of years, but folks in Louisa County, Va. must not have had it in their phrase book. After spending six years at Virginia Polytechnic Institute, first getting an undergraduate degree in mechanical engineering and then a master's degree in physics, Dale Long – a Louisa County native – swore he'd never set foot in Blacksburg again. Maybe it was the hot, humid climate of Alabama and Florida, or perhaps the mysterious allure of the Blue Ridge, but whatever it was proved "never" wrong yet again. Married and holding a Ph.D. in physics from Florida State University, Long came back to Virginia Tech in 1967, and has not looked back since. This summer, he'll retire after having taught physics for 33 years.

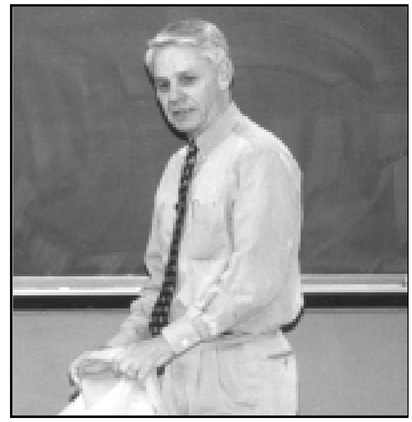
"My reason for entering physics is somewhat unusual," states Long. "While finishing my degree in engineering at Tech (1958), I came to believe that I should devote my life to being a missionary in some other country. I knew there was a need for educators at the Baptist sponsored colleges overseas, but I discovered that need was primarily for math and science teachers, not engineers. With that motivation, I decided to go to graduate school in physics. Needless to say, things changed and that foreign missionary career never came about."

It seems, however, that completing the physics master's degree was nearly mission impossible. "Dr. Hahn (then chairman of the physics department and later president of the university) assured me that my engineering background prepared me well for graduate school in physics . . . but that was hardly the case! As an undergraduate, I had seen a differential equation applied *once* outside the introductory differential equations course, and I still remember being puzzled about what that was all about. And I doubt that I had ever even heard of quantum mechanics.

"I struggled, but I did manage to get the MS degree, which gave me the opportunity to teach at Howard College (now Samford University) in Birmingham, Ala."

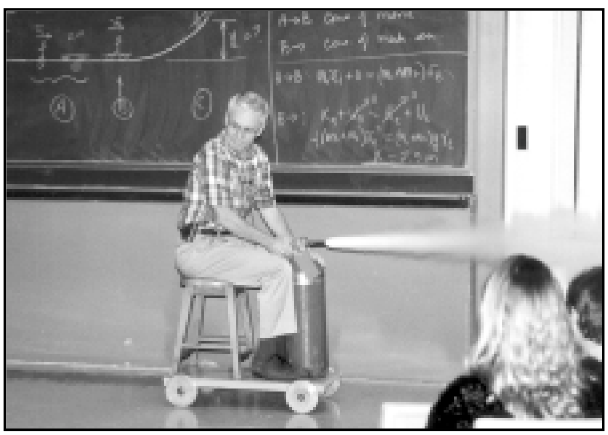


Physics education has been Long's deepest interest for many years. He says that he has always enjoyed trying to find ways to get students to learn. "Getting them to discover the generality of the basic laws that govern the universe is a constant challenge, especially with students of modest abilities or those who think they have no reason to learn physics." In the introductory courses, Long often encounters just those kinds of students. But finally seeing the "ah-ha" on their faces, he says, gives him the feeling that he may have made a difference.



Prof. Dale Long, at Virginia Tech since 1967, explains that demonstrating concepts helps students learn physics.

"It's hard to beat the satisfaction of having a former student come by to let me know with a smile, a handshake, or sometimes a hug, that we connected both in the physics and in those aspects of life that might be even more important than the physics."



Jetting across Robeson 210, Long gives his students proof positive of the principle of conservation of linear momentum.

In the late 1970s and early 80s, Long was involved in writing and revising a conceptual textbook entitled, *The Physics Around You*. His engineering background influenced his view that the practical applications of physics problems are an integral part to any introductory class. Working on the book has had a major impact on the last half of his career, Long notes.

"Being forced to think through the laws of physics carefully enough to be able to express them in words, without extensive use of math, has had a significant, positive influence on my philosophy of teaching and on my approach to communicating with students."

According to Long, student involvement and active-learning strategies rather than lectures are the best way to get students to learn physics. "A vast majority of today's students cannot or will not learn by observing a traditional lecture, even one that includes a variety of elements such as demonstrations, computer animations and simulations, video, and discussion. Traditional techniques are not working, and this fact is borne out by extensive research in physics education. It is essential that we find ways to involve students actively in doing things that instill learning."

Besides trying to improve ways to reach college students, Long has also endeavored to improve the training of physics education and educators at the secondary level. Long mentions that one of

Continued on Page 4

Matter is Ordered, so Order Matters

Nobel Laureate offers insights on a new way of teaching high school physics

Dr. Leon Lederman received the Nobel Prize for physics in 1988.

"To understand the most fundamental particles and the forces that cause them to cluster and interact to build up the things we can see and touch is, then, the 'first science.' All other sciences ultimately must rest on the basic laws of nature that govern the behavior of the elementary particles."

- Dr. Leon Lederman

Students learn science in the wrong order, said Nobel physicist Leon Lederman, who was part of a group that won the Nobel Prize in 1988 for work done in the 1970s that helped define the Standard Model of matter.

"For 100 years or more, students have been learning sciences alphabetically—biology, then chemistry, then physics," Lederman said. "It's time for a change. That's the wrong order." Lederman sprinkles his talks with humor and analogies that help non-scientists understand his points.

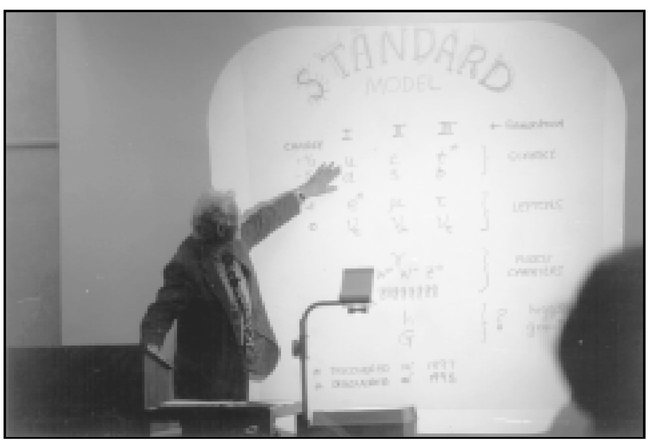
Lederman, the first speaker in the Torgersen Lecture Series, presented his rationale and supporting arguments for a revision of the high school science curriculum. The series, which was named after former university president, Dr. Paul E. Torgersen, was inaugurated this year to bring great scientists to campus to discuss topics that affect contemporary society and will impact future generations. Lederman has long been involved in the improvement of science education in secondary schools, and his talk, "This Year's New Thing in High School Science Education," discussed the reasons physics should be taught first in high school.

Basically, Lederman said, atoms, which are taught in physics, should be taught first. "Today, we know that all matter is made of atoms and that atoms are complex structures made up of smaller and more elementary objects," he said in a 1996 speech. "To understand the most fundamental particles and the forces that cause them to cluster and interact to build up the things we can see and touch is, then, the 'first science.' All other sciences—materials science, chemistry, biology—ultimately must rest on the basic laws of nature that govern the behavior of the elementary particles."

"We need to start at the bottom," Lederman said recently. The order in which sciences are taught in high school now is "the equivalent of starting with Shakespeare and progressing to Dick and Jane," he said. In his talk, Lederman charged the audience with the responsibility of insisting on sensible reform of high-school education, he said.

Lederman's work with both students and colleagues has brought about important advances in understanding particles and how they interact. The work has contributed not only missing "puzzle pieces" of the Standard Model, such as the bottom quark, but also to methods for conducting the experiments, thereby removing obstacles to further study of weak forces at high energies. Their neutrino beam method revealed the hard inner parts of protons, for example.

Lederman's Nobel-prize-winning work was done with two other scientists when they were associated with Columbia University in New York. Lederman was associated with Columbia University for more than 30 years. He served as director of Nevis Laboratories in Irvington, N.Y., Columbia's center for experimental high-energy physics research. He also served as director of Fermi National Accelerator Laboratory in Batavia, Ill. He is a member of the National Academy of Sciences and has received numerous awards, including the National Medal of Science, the Wolf Prize in Physics, and the Enrico Fermi Prize given by President Clinton. He is the author of the book *The God Particle*.



Lederman explaining the history of the Standard Model.

Since his retirement as director of Fermilab in 1989, his passion has been middle and high-school science education, and that was the mainstay of his talk at Virginia Tech. He is presently the Resident Scholar of the Illinois Mathematics and Science Academy.

Lederman gave two other talks while in Blacksburg. The first, titled "What Do We Do When We Can't Build Machines?" was oriented for college and university science faculty and students. The second, in which he spoke about the history and progress of modern science, was for an audience of middle and high-school teachers and students.

Article by Sally Harris, College of Arts & Sciences

2000-2001 Award Winners

Alice Estes Martin Scholarship
Alma Robinson

Col. Nelson Carey Brown Memorial Scholarship
Jennifer Beard

Daniel C. & Delia F. Grant Scholarship
Steven Hair, Joshua King & Jerome Mettetal

Diane Hoffman Scholarship
Jaime Ruiz-Avila

Frank Leigh Robeson Scholarship
Alma Robinson

H.Y. Loh Award
Seth Hornstein

Hugh D. Ussery Scholarship
Anubav Vassudevan

Lubna R. Ijaz Scholarship
Adam Drake

Robert C. Richardson Scholarship
Michael Bryant

Robert P. Hamilton Prize
Joshua King

Theodore E. Leinhardt Scholarship
David Ferguson

Webster & Sara Schoene Richardson Memorial Scholarship
Beth Reid

C . H. Wan Scholarship
Seth Smith
Robert Astalos

The Raymond F. Tipsword Graduate Scholarship
Prapong Klysubun

The Jamie Dunn Award
Sathon Vijarnwannaluk,
Robert Astalos

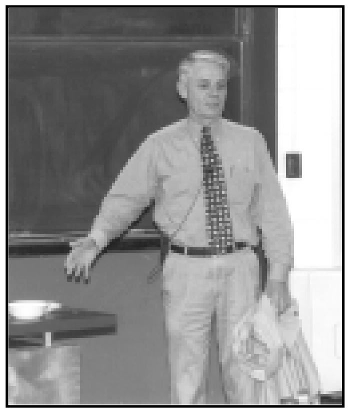
Philip Morris Fellowship
to be named

Long Retires

Continued from Page 2

the most satisfying experiences he has had in relation to teaching was in connection with the programs he helped direct for high school physics teachers. He states that working with that program was one of the most difficult but rewarding things he has ever done as an educator.

Many of Long's former students can attest to his effectiveness as an instructor. Amy Emerson, a recent graduate of Virginia



Tech's physics program, writes of Long, "Dr. Long is one of a kind. I've taught recitations for his classes a few semesters, and his students are always commenting about all of the demonstrations that he uses in class. I really think that he goes to great lengths to make his class fun and student-friendly.

"One of the most interesting things that I've witnessed about his teaching style is that it's contagious. At the end of last semester when I was teaching his recitations, I mentioned the Physics Outreach to the students. I explained that the outreach program gives college students a chance to work with middle and high school students, doing mini-labs and demonstrations – 'Fun Physics' – as I call it. About 15 of the 22 participants who volunteered to help are students who completed Physics 2305 with Dr. Long.

"In one of our discussions, students were asked to tell the group what got them interested in doing science. A number of the students wrote about how much Dr. Long's class had influenced their interest in physics. Plus, at just about every planning meeting when we're deciding what activities to do at a school, the students get into side discussions about all of the demos Dr. Long used in their class, and how "awesome" they were. The outreach students seem very intent on teaching the material with the same excitement and enthusiasm that they saw their own 2305 professor doing it!"

"Dr. Long is one of a kind. . . . he goes to great lengths to make his class fun and student-friendly."
- Amy Emerson, '98

Retirement does not mean slowing down for Long, but a refocusing of his energies on other areas of his life.

"For one thing, I coordinate a group at my church that carries out minor construction and repairs on the houses of needy families in the area. I would really like more time to do that sort of thing in a more organized and consistent manner. Also, I'd like to spend more time making use of the numerous wood-working tools that my family has given me in recent years.

"My kids keep buying new "old" houses that they want me to be involved in renovating. How can I resist that opportunity? And I want to do some writing about family history (Long is the youngest of 13 children, so it's likely he'll produce a lengthy book!) None of these things includes the to-do list at my house that has been accumulating for years."

Long's wife, Lou, is an attorney in Blacksburg. They have two sons, Don and Doug. Don and his wife Valerie, both of whom are attorneys, live in Charlottesville, Va. Doug and his wife, Elaine, are expecting a son (already named Wilson) in August. Doug works in health-care consulting and Elaine works in human resources; the couple lives in Charlotte, N.C.

Physicists Report on Research Programs

Scientists describe new and on-going initiatives

Researchers of the Condensed Matter Theory group and physics students listen to presentations given at a mini-conference hosted by Drs. Schmittman, Täuber, and Zia.

Condensed Matter: Theory

Although complex systems abound in nature (transport processes of nutrients, chemical signals, etc. by living organisms) and even in man-made environments (traffic flow in multilane interstates), they are only very poorly understood at a fundamental level. In contrast, systems without transport currents (also referred to as "systems in thermal equilibrium") have been studied for over a century, and the associated theory (equilibrium statistical mechanics and thermodynamics) is routinely taught in undergraduate and graduate courses.

The general research goal of the condensed matter theorists is to characterize complex systems with many constituents subjected to external forces, which impose mass or energy transport through the system.

Together with several undergraduate and graduate students, the Condensed Matter Theory group is investigating simple models for non-equilibrium systems, in order to understand how their behavior differs from their equilibrium counterparts. They have discovered numerous surprising features: for example, particles in non-equilibrium systems tend to be much more strongly correlated with one another.

According to Prof. Royce Zia, the research is very accessible to undergraduate students. His colleagues, Beate Schmittmann and Uwe Täuber, are also working with students as they look into various problems.

"First of all, very little is known about non-equilibrium systems so that the learning curve is not too steep, and secondly, computer simulation and visualization form an essential investigative tool so that our students can play a key role by developing codes."

Condensed Matter: Experimental

The CME group, which includes Drs. Zallen, Ritter, Indebetouw, Heflin, and Graupner are carrying out research on a variety of unique materials including fullerenes, photorefractive polymers, crystalline and amorphous semiconductors, nanocrystalline solids, sol-gel materials, and ceramic oxides. The issues addressed include new phenomena in nonlinear optics, image processing, tribology, and spectroscopic effects of ultra-small crystallite size.

Nonlinear optical effects in organic materials such as polymers and fullerenes are exploited both to determine fundamental properties of the materials as well as for commercial applications. In addition, new photorefractive polymers are being developed for applications in holographic data storage.

Nanocsale effects in ultrafine sol-gel ceramic powders and in semiconductor multilayers are being studied via Raman and optical spectroscopy. Novel approaches to the reduction of friction and wear between ceramic components by tribopolymerization are also being explored.

Organic semiconductors are studied for their photovoltaic and light emitting properties in organic optoelectronic devices.

Collaborations exist with groups in Chemistry, Chemical Engineering, Electrical & Computer Engineering, and Materials Science Engineering at Virginia Tech as well as companies and several groups abroad.

Particle Physics: Experimental

Dr. Marvin Blecher is conducting a study of gamma ray reactions on nucleons with polarized gamma rays and polarized targets at the Brookhaven National Laboratory in Upton, N.Y. Blecher is working with Brookhaven scientists Dr. Andrew Sandorfi and Dr. Craig Thorn, as well as post-doctoral researcher, Dr. Takehito Saitoh and Virginia Tech graduate student Holger Meyer. The experiment, which is set to run for another three to five years, has two goals: first, to test the various theoretical predictions such as the Drell-Hearn-Gerasimov sum rule and second, to measure properties of the nucleon such as spin and electromagnetic polarizabilities.

Prof. Mark Pitt has been studying the structure of the proton and neutron using high-energy electron accelerators at the MIT-Bates Linear Accelerator Center in Boston, Mass., and the Thomas Jefferson National Accelerator Facility in Newport News, Va. The goal is to determine how the "sea" of strange quark-antiquark pairs contributes to the magnetic moment of the proton. The work also involves postdoctoral fellow Alice Hawthorne-Allen, former students Joseph del Corso and Aaron Herrnstein, and physics student, Victor Gehman, '00. This work is funded by a National Science Foundation Early Faculty CAREER Award.

Continued on next page

Research Efforts

Continued from previous page

Dr. Bruce Vogelaar, along with Dr. Mark Pitt and graduate students Mark Makela and Henning Back, are working on two experiments, the first dealing with solar neutrinos and the second involving ultra cold neutrons.

Vogelaar and Back are preparing calibration and monitoring equipment and procedures for use in the Borexino experiment at the Gran Sasso Laboratory in Italy. While colleagues at the University of Milan are focusing on the light-source testing equipment (lasers, etc.), Virginia Tech's researchers are developing a way to manipulate radioactive sources for testing the internal detector. The Borexino experiment is designed to measure the Berillium 7 solar neutrino flux. The goal of the research is to determine if solar neutrinos have mass. The experiment is funded by the NSF as well as a number of European science organizations and will take place over a number of years.

Vogelaar, Pitt, and Makela are preparing to conduct research at the Los Alamos Neutron Science Center (LANSCE) in New Mexico. The researchers expect the LANSCE experiment will allow them to obtain a value for the A-correlation of neutron-beta decay. This value could reveal physics that goes beyond what the Standard Model now describes.

This model of the Borexino detector is on display at a gallery in Rome, Italy.

Astrophysics:

Dr. John Broderick and colleagues from the National Radio Astronomy Observatory (NRAO) are using the recently completed Very Large Array Sky Survey (NVSS) to identify and study the kinds of objects in the universe that are giving off radio emissions. The NVSS has detected and catalogued nearly 1.8 million sources; the group's goal is to understand the causes of the radio emissions from galaxies and determine the implication those emissions have on the types of environments in which they are generated.

To understand the emissions, the scientists are using a combination of other radio surveys (made at different wavelengths or angular resolution), as well as surveys done at other wavebands, such as x-rays, infrared, and optical. Their task has been to find the coincidences in the position of NVSS sources and objects from other wave bands.

The data were initially gathered in New Mexico at the NRAO's Very Large Array site. Broderick can analyze the data using his computer at Virginia Tech, but other work is done in Charlottesville, Va.

The current project, a catalog that identifies large galaxies (ones that are larger than one arc-minute in size), should be finished this summer or fall. The group recently finished identifying the Bright Source Catalog (BSC) of x-ray sources made with the Röentgen Satellite (ROSAT). The results of that study are to be published in the Astrophysical Journal Supplements Series within the next few months.

The Virginia Tech Spectral Line Sky Survey (VTSLSS) is being conducted by faculty members John Simonetti and Brian Dennison, with funding from the National Science Foundation (NSF). A number of graduate students have participated, as well as many undergraduates, who have been funded through the NSF's "Research Experience for Undergraduates" program.

The goal of the project is an atlas of high-sensitivity digital images of the Warm Interstellar Medium (WIM) – the 10,000 degree gas that fills much of the space between the stars in our galaxy. While concentrations of WIM around hot young stars were well known years ago, the more widespread, "diffuse," faint WIM is not well mapped.

Dr. John Simonetti (standing) guides astronomy students through the analysis of data gathered from various sky surveys.

The VTSLSS aims to map the small-scale structures at a resolution comparable to other major sky surveys (e.g., the Infrared Astronomy Satellite, or IRAS, survey). The coverage of the VTSLSS atlas will be the northern hemisphere of the sky.

Images from the survey are made available to the astronomical community through the web (the URL is below). The results bear upon questions of cosmological importance.

The instrument the team uses is the Virginia Tech Spectral Line Imaging Camera (SLIC) housed at the Martin Observatory at Virginia Tech's Miles C. Horton, Sr., Research Center in nearby Giles County.

The multi-year project started in 1994 and has already resulted in images of much of the northern hemisphere.

http://www.phys.vt.edu/halpha

New Building

Continued from Front Page

recitations, and labs.

"Robeson Hall will not fall by the wayside, of course. The space opened up in Robeson will be put to good use by our researchers who have needed the room to grow their own laboratories and work spaces. The new building is good for everyone."

The new four-story, 90,000-square-foot facility will house study spaces, teaching labs, and support space. Pending the receipt in July 2000 of another $2 million authorization from non-General Fund sources, two 200-seat lecture theatres will fan off the Campus Drive side.

Working drawings should be in hand by April of 2001 with the bid date slated for July 2001. Completion is anticipated for the fall of 2003.

Thanks to Jean Elliott of the Spectrum for contributing to this article.

Exemplary Award

Continued from Front Page

about advancing the science of physics as well as sharing the efforts of their research with our students.

"Physics majors here benefit from our integration of teaching and research in a variety of ways," noted Chang. "They are exposed to hands-on experiences of working with experimental apparatus and analytical tools at a relatively early stage. Those who start research early have the chance to work in a number of different areas before they graduate, which in turn helps them make a mature, informed decision about their choice of graduate studies or corporate employment."

Each physics major has his or her own testimonial about the enriching undergraduate research programs. Mark Wallace, '99, gave an account of his undergraduate research experiences as an example of the Physics Department's commitment to student participation.

Wallace received funding through NSF, presented findings to scientists, and studied galaxy rotation at the National Radio Astronomy Observatory. As his research interests changed, Wallace then worked with Dr. Bruce Vogelaar, who studies solar neutrinos, which are extremely minute subatomic particles that at this time have an undetermined mass. As he completed his undergraduate work, Wallace traveled to Gran Sasso, Italy, to work with an international team on the experimental neutrino detector.

"My research experiences helped me in the classroom by demonstrating how the fundamentals of physics apply to actual problems," said Wallace, who is now in the Ph.D. program in physics at Michigan State University.

Dr. Guy Indebetouw (left) works with undergraduate, Jaime Ruiz-Avila, '00, during a research session.

Speaking of his undergraduate physics education at Virginia Tech, Carter Hall, '98, states, "I was able to spend a large amount of time working in two fields . . . and this experience has proved invaluable to me as a graduate student." Currently a doctoral student and teaching assistant at Harvard, Hall states succinctly, "Virginia Tech's Physics Department treats majors as scientists-in-training."

"I am glad to hear such positive comments from our students about what we do in our program and that they find the experience here at Virginia Tech to be so useful and productive," Chang said.

"I believe the 'scientist-in-training' approach that forms the Physics Department's philosophy of teaching is the reason we are recognized as an exemplary department."

ALUMNI NOTES

Frank Summers (B.S, Physics, '88) is one of the principal astronomers for the newly opened Rose Center for Earth and Space at the American Museum of Natural History in New York City. Summers is also the lead curator of the astronomy exhibit, and was involved with every stage of its development. He has spent the last four years working on and overseeing its conception, design, and fabrication.

Summers received his master's (1990) and Ph.D. (1993) in astronomy from the University of California at Berkeley. The Rose Center's web page is: **http://www.amnh.org/rose/**

Chadd Smith (B.S, Physics, '94) is now in his sixth year of graduate school at Johns Hopkins. He is currently working on the CDF experiment at Fermilab, doing a search for gluino decays in Run I data. Smith was married in Baltimore on March 15 of this year. His wife, Pai Meng, will be graduating from the University of Maryland's medical school this spring. The newlyweds will be moving to Chicago in June so that she can start her residency at the University of Chicago, and Smith can continue his work at the lab in nearby Batavia, Ill.

Josh Steele, (B.S., Physics, '97), has been doing research on carbon nanotubes at UNC-Chapel Hill. Steele has specifically looked at the nanotube's mechanical properties and found that they have certain preferred orientations that not only affect the motion of the tubes, but possibly their electrical properties as well. Steele received his master's degree from UNC in December 1999. His paper, "Atomic Lattices Can Act Like Gears," will be published in *Physical Review Letters* within the next few months. He returns to Blacksburg in the fall to start a master's program in computer science.

SPS Chapter Earns Outstanding Chapter Award

Virginia Tech's Society of Physics Students (SPS) chapter has been named a 1999 Outstanding Chapter by the American Institute of Physics. It is the chapter's third consecutive award and its sixth honor in seven years.

Dr. Jerome Long, physics professor and faculty sponsor of the SPS organization, explained the criteria for eligibility to earn an Outstanding Chapter award. "First and foremost, the chapter has to be active," said Long. "Of particular importance is that the SPS members meet regularly, be involved in community outreach programs, attend professional development lectures and seminars, and organize social gatherings. It's also important that chapter members maintain an active Sigma Pi Sigma group, which is the physics scholastic honor society."

According to Long, Virginia Tech's SPS group was one of only three chapters in its zone to win the award. The Virginia Tech chapter of SPS is in Zone 4, which consists of 39 other chapters in Virginia, Maryland, and the District of Columbia. The organization's 18 zones account for its 665 chapters; there are approximately 5,800 SPS members across North America.

Senior Adam Drake, of Charleston, W.Va., is the 1999-2000 president of Virginia Tech's SPS chapter. "We're very pleased to get this award. As most people know, being a physics major is quite difficult and the rewards are mostly internal.

"Getting national recognition as a 1999 Outstanding Chapter is great for morale. It shows just how hard past and current members of this chapter have worked to make it the wonderful organization that it is."

Membership in SPS is open to any person interested in physics; he or she need not be a physics major or an undergraduate.

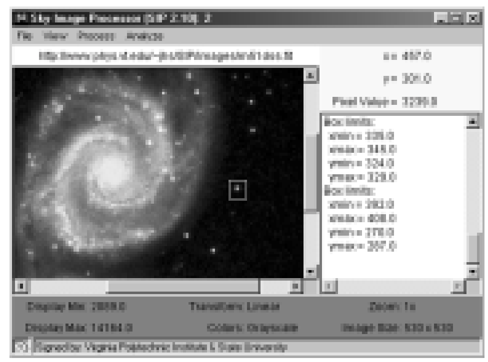
SIP: More than a Taste of Astronomy

John Simonetti, an astrophysicist in Virginia Tech's Physics Department, has developed a Java-based educational tool used for analyzing astronomical data. His program, the Sky Image Processor, or SIP, has been featured in *Sky & Telescope* magazine (Nov. 1999), and has also been mentioned in the news media.

According to Simonetti, SIP has a number of benefits. "An instructor in astronomy can use SIP to enable students to load and analyze images from anywhere on the web. Java scripting ensures that everyone gets the same program without having to load any software onto any machines. Students can do the work from any computer: in a collective lab setting, from a campus computer lab, or from home.

"This sort of decentralized, distance-learning usage was the main motivation for writing this program. We use it in our Introductory Astronomy course, and plan to use it in our public and school outreach programs."

The program provides simple, yet quite general tools that enable the user to carry out standard image processing procedures. Complicated procedures (e.g., unsharp masking) can be accomplished in a step-by-step fashion, using the tools provided, allowing the user to learn and understand how the procedures work. Unlike commercial processing software, there are no "black box" procedures.



Benefits of the SIP interface inlcude its ease-of-use and ability to be run on any machine. It can be used by astronomy students and teachers alike.

The program is available free, via the web, at **http://www.phys.vt.edu/SIP**

Virginia Tech
Physics Department
123 Robeson Hall
Blacksburg, VA 24061-0435