The PHYSICS MAJOR

SONOMA STATE UNIVERSITY DEPARTMENT OF PHYSICS AND ASTRONOMY

DeFreez Is Distinguished

Dr. Richard K. DeFreez ('80) was selected as one of Sonoma State University's Outstanding Alumni this year. One of 26 to be so honored since 1987, he is the first physics graduate.

As an undergraduate at SSU DeFreez was one of the first to be selected for the American Physical Society's prestigious industrial internship program. He worked in Bethlehem Steel's research labs on the use of lasers to detect methane remotely in coal mines. So successful was he that the company awarded him a research grant, which he took with him when he started graduate school at what is now the Oregon Graduate Institute of Science and Technology (OGI).

A late bloomer, DeFreez received his B.S. at 35, but he made up for it. Just five years later he had his Ph.D. in applied physics. He remained at OGI to continue his research with lasers and their applications. Within a short time he became head of a large and active research group. He and his coworkers were recognized by the Optical Society of America for one of the twelve most innovative advances in optics in 1986: Focused-ion-beam micromachining.

Still active in remote sensing of gaseous chemical species, his research interests now include high–power, high-brightness semiconductor lasers, medical and other biological applications of lasers, picosecond optoelectronics, non-linear dynamics, and optical chaos also.

Now a senior research scientist at the Linfield Research Institute in McMinnville, Oregon, Dr. DeFreez remains advisor to several graduate students at OGI. He is currently collaborating with Electro Scientific Industries and the Oregon Medical Laser Center in the development of compact laser sources for the inhibition of accelerated arteriosclerosis, and he is also investigating the possibility of using dye lasers to mark hatchery salmonids to distinguish them from endangered natural runs.

A member of the board of the Oregon Museum of Science and Industry, Rick DeFreez holds one other distinction: He is the first graduate of SSU's Department of Physics and Astronomy to serve as thesis advisor to another. Geoffrey Wilson ('84) earned his Ph.D. in applied physics under DeFreez in 1992.

$ for Instructional Equipment Return

Sonoma State University's re-engineering efforts have reduced expenditures for support staff, faculty, and supplies in response to reduced levels of state funding. The process has also allowed replacement of some obsolete instructional equipment for the first time since the elimination of state funding for this purpose 4 years ago.

The Department of Physics and Astronomy has obtained $11,500 to purchase data acquisition units for the lower division laboratory courses. These interface devices will permit collection of data from experiments directly into computers. Macintosh II-class computers will be installed in Darwin 338 to utilize the new equipment. Associated software will permit students to analyze and graph their data to transfer results directly into their lab reports.

The computers to be used have already served a few years as faculty workstations. They became available after the University provided new PowerMacs to most faculty last fall. All faculty are expected to have new workstations by 1996.

With partial funding from private donations, the Department will soon put a PowerMac 7100 AV on department technician Steve Anderson's desk, augmenting his capability to assist faculty in developing new laboratory experiments and lecture demonstrations.

The Department's next goal is to upgrade upper division laboratory courses. Donations to the SSU Academic Foundation, with instructions to direct them to the Physics and Astronomy Supplies fund, would be a great help.

A Successful Reunion

A cool, windy afternoon did not prevent some forty people from enjoying the Department of Physics and Astronomy's fourth reunion, an on-campus picnic held jointly with the Society of Physics Students May 7.

Graduates came from as far back in time as 1975 (Dean Chaney and Thom Erickson) and as recently as 1994 (David Lamb and Mark Robinson) and from as far away as Düsseldorf, Germany (Allyson Bishop, '86) and as close as Cotati (Joann del Corral, '83).

The grads and their families were joined by current students Amanda Tunison and Susan Webster, and professors Duncan Poland, Saeid Rahimi, and Joe Tenn. All were grateful to organizers Miriam Carolin ('82) and Mark Robinson ('94) and to the caterer, Out to Lunch.

Report from Heidelberg

Scott and Sean Fraser

Study abroad is a nice way to finish a B.A. Although we are spending this year in Heidelberg, Germany, every now and then we get a sense of *déjà vu* because the main science campus here resembles the pre-landscaped SSU. Luckily for us, the theoretical physics buildings enjoy a great view of the town's castle and river valley.

In some ways, studying in Germany makes you appreciate how well SSU takes care of you. Generally speaking, the distance between students and professors is wider than what we are used to. Most of the physics professors do not have any formal office hours—you have to meet them by appointment or by discovery. There is a neat custom here where students "applaud" at the end of a lecture by knocking on their desks. Students seem to be a bit more self-motivated here, since they are more or less on their own in a rather chaotic system. For example, there is no formal registration for classes, and there is no such thing as an official transcript.

On the other hand, there is considerable freedom in taking what you want. German students do not experience end-of-semester stress in the same sense that we do, because they generally do not have semester finals for each class. Instead of grades, students take short comprehensive oral exams every few semesters.

It's hard to believe that our year in Germany is almost over. Being close to England, we decided to apply to the University of Cambridge, something we never otherwise would have done. Being accepted to the master's program at Cambridge was the most unexpected thing of all. It looks like we'll be spending one more year abroad.

Another Good Year for WPD

SSU's renowned public lecture series, "What Physicists Do," continued to attract people from far beyond the campus in 1994-95. Professor Lynn Cominsky presented 24 lectures and one film over the two semesters.

The fall series started with an account of the MACHO (Massive Compact Halo Objects) project and continued through such topics as engineering and scientific ethics, inertial confinement fusion, styles and personalities of physicists, the 1994 collision of Comet Shoemaker/Levy 9 with Jupiter, and the Stanford Linear Collider.

The spring series included everything from Incan astronomy to the physics of the violin. Ultracold liquid helium-3 and helioseismology were also represented, as was a connection between physics and sculpture.

Five of the Department's graduates spoke in the series: Jim Eyer, '83, who recently left PG&E's Research and Development group to start his own business, spoke on Advanced Electricity Technology in the fall.

Nickolas Melville ('93) described the development of a simulation program for an electric car. Mercedes-Benz sponsored his work for a master's degree in mechanical engineering at the University of California, Davis.

Dr. Valerie Leppert ('87) spoke on growing superconductors and semiconductors with high-power lasers, which she did for her Ph.D. in materials science.

Dr. Keith Brister ('82) presented A Guided tour of CHESS—the Cornell High Energy Synchrotron Source —where he has worked since earning his Ph.D. in applied physics at Cornell in 1989.

Eric Weiss ('91) presented The Anatomy of a High Energy Particle Detector, an account of the SLD detector at SLAC, where he is conducting research for his Ph.D. in physics at the University of Washington.

For the 50th semester of "What Physicists Do" this fall, the series' founder, Dr. Joe Tenn, is planning to celebrate by bringing back a few of the favorite lecturers from the first forty-nine semesters. The series will begin Monday, Sept. 11, at 4:00 p.m. Don't miss it!

We're on the Web

Sonoma State University has begun using the World Wide Web to make information available almost everywhere rapidly and cheaply .

Anyone connected to the Internet with a web browser can go to http://www.sonoma.edu to learn about SSU in general, or directly to the Department of Physics and Astronomy's "home page" at http://yorty.sonoma.edu. You can find this newsletter, last year's issue, the Department's annual Observatory Report to the *Bulletin of the American Astronomical Society*, and information about courses, faculty, job opportunities, grad schools, and other subjects. Where but on the Web can you look up zip codes, phone numbers, maps, recipes, newspapers, traffic reports, stock prices, and weather, and then gaze at a professor's horse?

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Edited by Joe Tenn

Written by Lynn Cominsky, John Dunning, Daniel Hale, Rodney Lee, Duncan Poland, Greg Sprehn, Saeid Rahimi, Joe Tenn, and Amy Weber

Activities of a High Energy Astrophysicist

Dr. Lynn Cominsky continued to balance her time between teaching and research this year. Her research activities were divided between NASA-funded research at SSU and work at the Stanford Linear Accelerator Center on several projects in X-ray and gamma-ray astronomy. She helped organize a conference at SLAC on developing a new generation of high energy gamma ray telescopes. The conference created a great deal of enthusiasm for the science which can be done using silicon strip detectors in an orbiting telescope to detect gamma-rays with energies higher than 20 MeV. The proposed Gamma-ray Large Area Space Telescope (GLAST), recently approved by NASA for further study, would observe pulsars and quasars at very high energies with unprecedented angular and energy resolution and with a field of view wide enough to allow most of the sky to be viewed continuously.

Students Dan Hale, Siana Hurwitt, and Susan Webster participated in Dr. Cominsky's astronomical research at SSU this year. During the fall they learned how to use Unix-based computers to perform astronomical data analysis. Hale continued in the spring, investigating whether optical radial velocity curves of accretion disks (which are often used to estimate the masses of black holes) give the correct answers for neutron star masses (which can be independently determined using Doppler-shifted pulsation light curves).

In November the American Astronomical Society's High Energy Astrophysics Division met in Napa. Many SSU students volunteered to help out at this meeting including Amanda Tunison, Dan Hale, Willie Rodriguez, Greg Madruga, and Jorge Polanco. Some of the Department's graduates were also pressed into service, including Greg Sprehn (now at UC Davis/Livermore), Mallory Roberts (now at Stanford University), and Holly Jessop (now at UC Berkeley's Center for Extreme Ultraviolet Astrophysics). At the meeting Cominsky presented her recent discovery (with Roberts and Simon Johnston of Australia) of X-ray emission from a binary system containing a radio pulsar and a main sequence Be star and theoretical interpretations (with Andrew King of England) of this emission. Cominsky's proposal to observe this unique system at apastron using the *ASCA* satellite was recently approved, and work on these data are just beginning. There are opportunities for more SSU students to get involved with this project, as well as with the analysis of data from the EGRET experiment on the *Compton Gamma Ray Observatory*.

In January Dr. Cominsky attended a meeting of the NASA working group on Science Operations and Mission Operations in Tucson, Arizona. This committee advises the NASA Office of Space Sciences about ways to improve efficiency of operating space-based astronomy experiments. She also attended a meeting of the AXAF Users' Group, which advises on policies and procedures for the *Advanced X-ray Astrophysics Facility*, one of NASA's "Great Observatories," scheduled for launch in 1998.

Students Describe Wonders of Physics

During National Science Week in April 1995 three Sonoma State University physics majors visited their former high schools to give talks and demonstrations about their field of study. Their goal was to relay the wonders of physics and how it affects everyone.

Amy Weber returned to Calaveras High School, where, at the request of her former teacher, Mr. Jim Pesout, she demonstrated double slit interference with a He-Ne laser. Afterward, Amy and students successfully compared experimental and theoretical results. Much of the remainder of the session was spent answering questions ranging from grades and costs to choosing a school and adjusting to college life. Pleased to see the number of college-bound students greatly increased since her graduation, Amy told the high school students that a college education is priceless.

Rodney Lee went back to San Marin High School in Novato to describe SSU's physics and astronomy program to Mr. John Treu's physics classes. He showed the benefits of using software such as *Mathematica* to model physical phenomena. Since astronomy is his forte, he showed students *EZ Cosmos*, a package which predicts and show positions and motions of celestial objects. Students were attentive, interested, and responsive. A great day! This reaffirmed his desire to teach high school physics.

Dan Hale returned to Benicia High School to talk to Mr. Douglas Houser's physics classes. He demonstrated and described lasers, polarization, spectra, and radioactivity. He showed the students how physics is applied to real problems on earth and in the cosmos. He found the classes very interested in what he had to say and extremely attentive to apparatus, especially the computer he brought. At the end of each of his lectures Dan answered questions about what college is like, how much time one studies for physics classes, and why he became a physics major. Dan believes he showed the students how important physics is to everyone.

All three SSU students were pleased with the response and interest they received from their listeners. Ties between colleges and high schools are important, and the students participating hope that they have begun a trend.

PION Brings Teachers Together

Physics in Our Neighborhood (PION) was formed at a December 1994 meeting in Santa Rosa hosted by the American Physical Society Committee on Education. It is one of a number of regional alliances of physics teachers established throughout the nation. The local group, which includes physics teachers at all levels in Lake, Marin, Mendocino, Napa, Solano, and Sonoma counties, and a few from beyond, meets about seven times per year, excluding summers and months with regional meetings of the American Association of Physics Teachers. The first meeting was held at SSU in January, and featured exploration of the World Wide Web led by Steve Anderson, Duncan Poland, and Joe Tenn.

In March the group met at Hewlett-Packard in Santa Rosa, where Dennis Derickson and his colleagues demonstrated current work in fiber optic communications.

The third meeting is at SSU May 13, with Piner High School teacher Jim Hill ('71) hosting a demonstration of the powerful teaching software, *Interactive Physics*.

Other physics teachers and physicists who would like to share their expertise with teachers are invited to contact Joe Tenn (joe.tenn@sonoma.edu) or Duncan Poland (duncan.poland@sonoma.edu) or to call the Department of Physics & Astronomy at (707) 664-2119. Further information may be found on the World Wide Web page http://yorty.sonoma.edu/people/faculty/tenn/PION.html.

A Milestone for Dr. Poland

The end of the 1994-95 academic year marks thirty years at Sonoma State University for Dr. Duncan Poland. For three decades his warmth, wit, integrity, and knowledge have been eagerly sought by those with work to be done. There is also the fact that he finds it difficult to say no. Consequently the hard-working physicist has served in a great many administrative positions—ranging from vice president of the university to head of the faculty union during its first year—and on hundreds of committees.

While chairing the Department of Physics and Astronomy for the past decade, he has also served as SSU's faculty representative to the National Collegiate Athletic Association and the Northern California Athletic Conference, (president of the Conference one year), chair of the Faculty Standards Committee, and member of the Property Survey Board. This spring he is on the committee conducting the periodic evaluation of one of the University's vice presidents, and he is the outside evaluator for the physics department program review at California State University, San Bernardino.

Still he finds time to teach more than his official share, specializing in the Physics 316 Modern Physics Lab, electronics courses, and the three introductory courses in the calculus-based physics series. Occasionally he gets to teach his specialty, solid state physics.

In the spring of 1996 Dr. Poland will take his second sabbatical leave. Asked about his plans, he replied:

"I will be visiting various universities that have been actively integrating computers and multimedia into their laboratory and lecture courses, hoping to find some that are successful in improving students' learning and are also appropriate for us. I will be reading recent books and journal articles seeking to update and re-introduce Physics 350 Descriptive Quantum Physics and Relativity into our curriculum as an upper division general education course. I also plan to get the electron spin resonance experiment running to add it to the Physics 316 curriculum."

Alumnotes and Quotes

STEPHEN D. JILKA ('71) is a program manager with XSoft, a division of Xerox Corp. Though based in San Diego he is currently working with the company's Cambridge, MA facility to port XSoft's Workflow Management application, *InConcert*, from the Microsoft Windows environment to Macintosh.

DAVID NIELSEN ('74) is a computer systems manager in the comprehensive emergency management division of the Utah Department of Public Safety. Formerly a computer specialist with the Environmental Protection Agency in Las Vegas, he has published several papers on the use of lasers for water quality assessment.

H. DEAN CHANEY ('75) is a senior health physicist with the Nuclear Regulatory Commission in Walnut Creek. Certified by the American Board of Health Physicists in 1985, he works on reactor decommissioning assessments.

SCOTT C. ANDERSON ('78) is developing CD-ROM titles for education and entertainment and writing a monthly Digital Video column for Videomaker Magazine. He co-authored *PC Graphics Unleashed* and has written several cover stories for *Digital Video World*. He is now working on an interactive space movie for CD-ROM.

I honed my problem-solving skills in the Physics dept. I also got introduced to computers, from which there seems to be no turning back.

ROY W. HARTHORN ('78) is chief of building and safety for the City of Santa Barbara and serves on several statewide committees related to building regulations, earthquake preparedness and historic buildings. He recently completed work for a master of public administration degree at Cal State Northridge with a thesis on post-earthquake safety assessment and disposition of historic buildings.

Thank You, Donors

Several of the SSU Department of Physics and Astronomy's activities depend on private donations. The "What Physicists Do" public lecture series and Public Viewing Nights at the Observatory are just two examples. As mentioned elsewhere, contributions to the Department's Supplies account have provided a computer for use in the stockroom as well as some equipment for laboratories. Privately funded scholarships continue to support several physics majors.

Donations to the Department are increasingly necessary, as the level of state support for public higher education continues to decline.

Contributions to any of the accounts may be sent to the Department Chairman, Duncan Poland, with a note designating for which fund(s) the donation is intended. Checks should be made out to the SSU Academic Foundation. All contributions are tax deductible to those who itemize. The Department thanks the following donors who have contributed since last year's newsletter.

#63853 OBSERVATORY
None.

#63851 PUBLIC PROGRAMS
Charles & Judith Buff, Santa Rosa; Marvin Chester, Occidental; Ruth Clary, Petaluma; Charles Daymond, Cotati; Donald J. Farmer, Sebastopol; Will Gipple, Novato; Francis & Geraldine Halpern, Santa Rosa; Dale Houston, Petaluma; Mary R. Jensen, Petaluma; Weston Kendall, Santa Rosa; Ralph & Hilda Mansfield, Santa Rosa; Mr. & Mrs. Francis V. Marshall, Petaluma; John Max, MAX Machinery Inc., Healdsburg; Charles & Norma McKinney, Windsor; Claudia Meyer & Paul Tipler, Berkeley; Mr. & Mrs. Bernard H. Meyers, Novato; Horace Newkirk, Santa Rosa; Robert & Bertha Rains, Santa Rosa; Damon & Linda Rarey ('88), Santa Rosa; Gregory Rehberg, Berkeley; Miriam Tobin ('90), Sebastopol.

#63850 RADIO TELESCOPE.
None.

#63852 PHYSICS & ASTRONOMY SUPPLIES.
Stephan Crandall ('82), San Jose; Joanne del Corral ('83), Cotati; Sierra Technology Group Inc., Livermore; Greg Sprehn ('93), Livermore.

#85960 PHYSICS & ASTRONOMY SCHOLARSHIP (current). Joe & Eileen Tenn, SSU.

#75960 PHYSICS & ASTRONOMY SCHOLARSHIP (endowment). David H. & Paula D. Bennett ('86), Novato; Robert Moffitt Bilodeau ('83), San Jose; Lynn R. Cominsky & Garrett Jernigan, SSU; Duncan & Marion Poland, SSU; State Farm Insurance, Rohnert Park.

#77020 SCIENCE AT WORK (endowment for "What Physicists Do" series). John Max, MAX Machinery Inc., Healdsburg; Joe & Eileen Tenn, SSU.

#78380 JOSEPH S. TENN SCHOLARSHIP (endowment). Mark Robinson ('93), Cotati; Daniel & Gail Tenn, Calabasas.

Applied Nuclear Course Thriving

Dr. John Dunning

Fourteen students took the applied nuclear chemistry and physics laboratory last fall, and more attended the companion lecture course. Our "Hot Hair" laboratory was extremely popular. Eight samples of students' hair were exposed for us at Washington State University's reactor, then returned, after a suitable cooling time, by overnight Federal Express. We were fortunate to see a wide range of longer half-life elements, with an average of twelve elements measured per sample. Almost all the samples had some gold, mercury, zinc, bromine, and, of course, sodium.

Other experiments such as the "Hot Rat" were just as interesting. By combining data taken at different times by the seven groups we were able to extract a biological half life of about 3 days for Iodine-131 in a rat.

For the first time we undertook the "Hot Detergent" experiment. This measured the cleaning efficiency of a detergent using a P-32 tracer. There were surprises. Acetone cleans very well. Next best is the DECON soap used to wash hands in the radioisotope complex. My own favorite dish soap fared poorly.

The course will be offered again in 1996. I look forward to a new higher-efficiency detector, a better lead shield, and a PC-compatible multichannel analyzer with a complete library of gamma rays. A tour of a local medical facility where I-131 studies are done is planned.

Alumnotes and Quotes

DOUGLAS MORRIS ('78) is a product manager with Motorola in Albuquerque, NM. Formerly an engineering manager and engineer, he has been awarded three patents.

CHAD GILLEASE ('80) is a member of the senior technical staff at True Time, Inc. in Santa Rosa.

KEVIN ABLETT ('83) is a Senior Software Engineer with Bender & Associates in Larkspur.

R. JEFFERSON PORTER ('83) has just completed his Ph.D. dissertation in nuclear physics at the University of California, Davis. His research has been with the Dilepton Spectrometer Collaboration at the Lawrence Berkeley Laboratory. He writes that this work is of interest as an electromagnetic probe of the hot-dense phases of heavy-ion collisions, and that more information can be found on the World Wide Web at http://macdls.lbl.gov/. He previously studied for an M.S. degree at San Francisco State,

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NORMAN E. BASHAM ('85) is a Programmer/Analyst with Davidson & Associates working on Macintosh MultiMedia/Edutainment commercial software. He formerly worked for State Of The Art as a software engineer writing commercial software for Magic Cap, Newton and Macintosh, and at Symantec where he wrote test utilities for the Norton Utilities for Macintosh, Symantec AntiVirus Macintosh (SAM) and Norton Essentials for the PowerBook.

MILTON HAGLER ('85) has moved to Vietnam, where he intends to teach *AutoCAD*. He was formerly a software developer with Softdesk, Inc. in Sausalito.

What Goes Up ...

Greg Sprehn, '93

Editor's Note: Greg Sprehn is in the Ph.D. program in applied physics at UC Davis/Livermore and also an instrument scientist in the Laboratory for Experimental Astrophysics at LLNL.

What goes up does come down. In my case it is 5000 pounds of instrumentation. I have been working on a telescope that is sensitive to gamma-rays with energies of 30 - 300 kev. There are plenty of these photons in space, many emanating from exotic astrophysical sources like accreting black holes and spinning neutron stars, but fortunately for our survival they don't penetrate the atmosphere. So I have to send my telescope into space. Satellites cost upwards of $60 million and take years to get launched, but there is another way.

Recall your childhood fantasies watching a helium balloon that got loose drift ever higher in the sky, until you have to concentrate to see it. Will it go past an airplane? Where will it come down? Could I ride on it if it were bigger? NASA ponders these questions at the National Scientific Ballooning Facility. Flights are made from a home base in Palestine, Texas, and occasionally from New Mexico, Antarctica, California, and Australia. It just depends on how high you want to fly, how far you want to go, and what you want to observe.

It is easy to figure out how high a payload will go. You have to displace a mass equivalent amount of air and take into account Boyle's gas law as the mylar balloon floats to thinner and thinner atmospheric altitudes. For a payload the size of ours, which is one of the largest ever flown, we need the largest balloon, 40-million cubic feet. Fully inflated, it is the size of a football field. We would like to be above all the atmosphere that absorbs our gamma-rays, but what we achieve is to float above most of it. It turns out that 140,000 feet is sufficient, well above any airplane altitudes. A rocket could take us that high, but we would only get a few minutes of observation time that way. To see even the brightest source, Cyg X-1, we need an hour of carefully pointed observation time. Since we like to look at three or four sources, we fly for 8 to 12 hours or more. So NASA has to figure out where we will be by then. The whole experiment is radio-controlled, and when the flight is over, (usually dictated by the on-board lithium batteries running down), NASA cuts the payload loose from the balloon and down it comes. Terminal velocity is achieved for 80,000 feet, so it comes down much faster than it goes up. (It takes about 3 hours to go up) Then with good design and any luck, the parachute opens and our million-dollar payload floats gently to earth, impacting at a mere 30 miles per hour (ouch). The balloon drifts back to earth on its own, $200,000 worth of mylar that Texas farmers are famous for keeping to build hay sheds and garages. It cannot be reused for flight, but is very sturdy stuff.

Predicting the trajectory of our payload is like predicting the weather. It would be perfect if it went straight up and came straight down, but the wind blows it away. It turns out that twice a year the winds at that altitude switch direction. It is much like the jetstream but much higher and more fickle. Sounding balloons are sent up every day during the campaign to determine the winds at various altitudes to try to predict the magic time of year when "Turnaround" occurs, when the winds are basically zilch. So in April and October, NSBF sets up in one hemisphere or the other and launches up to 8 payloads. A small Cessna flies at low altitude directly under the balloon so that at all times NASA has an assessment of what might get hit if it came down suddenly without a parachute. (This happens about 2% of the time, unfortunately). The balloon is so big you can actually see it at altitude, but an on-board Global Positioning System receiver sends back its true position, and the Cessna uses that information to stay below it.

My payload has been up twice from Palestine, Texas. The first time it drifted in the opposite direction from the predicted one and had to be cut down before it drifted over Houston and then the Gulf of Mexico. Cutdown was desired over dry flat land, but the FAA said we had to wait two minutes as there was a 747 on approach to Houston. Meanwhile, it drifted over a swamp, so it landed in scrub, trees, and 2 feet of mud. Recovery was tedious. The second time it blew west like it was supposed to, and landed near Midland, Texas, on dry ground. Of course, hitting dry ground made it bend up a bit, and we had to reweld it before using it again.

Now it is in Alice Springs, Australia. We took it there this spring to prepare for a launch, but when four of the five scientific groups participating dropped out for technical reasons the campaign was postponed to the next turnaround, this fall. It is a great launch location because we can see the galactic center from there, and since there are no cities for 900 miles, we can stay up for 24 hours and do more observing. The telescope works fine during the day since it is not sensitive to visible light. The only hitch is tracking, keeping it pointed at the source. At night, we use sensitive CCD cameras to point at stars and stabilize the on-board servo flywheels, but during the day we have to use the sun itself. So this flight will test a new sun-tracking system that actually centroids the position of the sun for a reference. The payload should come down somewhere near Longreach, home of Qantas airlines and Australia's largest rodeo. We have to set up a second tracking and telemetry station there since it will be over the horizon from the launch point in the center of Australia.

The flight is only for a day, but data reduction usually takes years. Now we are busy reducing the Palestine data and learning how this new instrument operates.

The next time you watch a carnival balloon drift upwards and wonder where it goes and what it sees, dream of a career with NASA flying really big balloons. For twenty years it has been an economical alternative to satellite experiments, and in today's cost-cutting days, it is becoming increasingly popular. NASA has a waiting list for launches.

New Developments in Advanced Labs

Dr. Saeid Rahimi

About a decade ago Physics 475 Physics of Semiconductors was offered for the first time. This two-unit course was designed to give insight into the basic theory of semiconductors and to make students familiar with a few basic and fundamental characterization techniques. The experiments were performed on germanium and silicon semiconducting samples prepared by students from wafers and ingots. Efforts were made to include simple devices, such as diodes, in the discussions.

Over the past ten years great advances in semiconducting devices and in automated characterization techniques have occurred. Consequently, I feel that the contents of Physics 475 should reflect some of these innovations, and inclusion of some basic theory and properties of more advanced electronic devices may be timely. The implementation of such a shift in the laboratory may require significant resources. However, a shift in the lecture part of the course is less cumbersome.

At this time I am planning to adopt the text *Solid State Electronic Devices* by B. G. Streetman, which is a well-known text used in many undergraduate electrical engineering programs. This book places less emphasis on the theory of semiconductors and more on devices than previous texts. If this shift in the theory part of the course proves successful, modification of the laboratory experiments will soon follow. My ultimate goal for the laboratory part of the course is for our students to make and characterize simple electronic devices here at SSU.

Physics 447 Lasers and Holography has been one of the most successful and popular courses in our department for a long time. The present course is the outcome of hard work by its originator, Dr. Isaac Bass, by Dr. Sam Greene who taught it in recent years, and by Steve Anderson, the department's valuable equipment technician and a well-known expert on lasers. During Dr. Greene's sabbatical leave last year, I was given the opportunity to teach the course, and I also found it very interesting. However, as with Physics 475, I feel that the tremendous recent advances in diode lasers and fiber optics suggest a shift in the contents of this course.

I have already introduced an infrared diode laser characterization experiment and would like to incorporate more diode laser and fiber optics experiments. The new additions do not necessarily require cancellation of any of the previous experiments with gas lasers. Rather, the idea is to make the longer experiments somewhat shorter and give the students more topics to choose from. My hope is that we can keep up with and make the students more familiar with those aspects of lasers that can be useful when applied to such fascinating fields as optical communications.

Alumnotes and Quotes

JON JURGOVAN ('85) is a patent attorney with Hopkins & Thomas in Atlanta. He earned his J.D. at Washington & Lee University and his M.S. in electrical engineering at California State University, Fullerton.

DAVID TURKINGTON ('85) is a project coordinator in the math, statistics, and computer science department at the University of Illinois, Chicago. He formerly taught high school mathematics and physics as a Peace Corps Volunteer in Cameroon. He has also taught English in Japan.

ALLYSON BISHOP ('86) earned her Ph.D. in biomedical physics at UCLA in 1994, and is now in Germany. She won a fellowship upon graduation from SSU..

PETER ROONEY ('86) is associate director of the Board on Assessment of National Institute of Standards and Technology Programs at the National Research Council in Washington, DC. He earned his Ph.D. in physics in 1995 at the University of California, San Diego, where he was a teaching assistant and an IBM fellow.

DAVID FASSETT ('87, physics and computer science) is a device drive engineer at Binar Graphics in San Rafael.

JOHN REYNA ('87) is an accelerator operator at the Fermi National Accelerator Laboratory in Batavia, Illinois. He is also studying toward a degree in computer science.

PHILIPPE ARGOUARCH ('88) is a computer graphic specialist at the Stanford Linear Accelerator Center and the main contributor to *SlacSpeak*, an on-line glossary of more than 2000 accelerator physics, computer and safety-related terms on the World Wide Web.

CHRISTOPHER C. COOK ('88) is a researcher in the quantum electronics group at the MIT Lincoln Laboratory in Lexington, Massachusetts and a graduate student in electro-optics at Tufts University.

KATHERINE RHODE ('89) is a graduate student and research assistant in astronomy at Wesleyan University. Formerly an astronomer in the high energy astrophysics division at the Harvard-Smithsonian Center for Astrophysics, she has also been a programmer analyst at NASA Goddard Space Flight Center and conducted research at the Maria Mitchell Observatory.

WILLIAM A. KOBABE ('90) is the owner and operator of a cabinetry business in Sonoma County.

JAMES GARRETT ('90) is a science teacher at Montgomery High School, Santa Rosa. He earned his teaching credential in physical sciences at SSU, where he has also been a graduate assistant football coach.

NANCY KUNNARI ('90) was just transferred to National Semiconductor, Santa Clara, where she is now a new product test engineer.

It is very exciting to be returning to California!...You are a fantastic group of educators. I appreciate the fact that while you have your research interest your primary focus is on teaching the students physics. This to me, is what sets SSU Physics apart from other schools. I remain a very proud SSU physics alum.

FRANCIS MORAES ('90) earned his Ph.D. in atmospheric physics this year at the Oregon Graduate Institute of Science & Technology, where he was a Department of Energy Global Change Fellow, and where he continues to conduct research on atmospheric methane concentrations over the last 160,000 years.

JASON I. ALEXANDER ('92) is designing and researching technology for solid state lasers at Lightwave Electronics in Mountain View. He earned his M.S. in physics in 1995 at Indiana University–Purdue University at Indianapolis, where he worked with ring lasers.

HOLLY JESSOP ('93) is a Staff Research Associate at the Center for Extreme UltraViolet Astrophysics (EUVE) at the University of California at Berkeley.

The practical experience I acquired from working on my own research projects at the SSU Observatory, from having access to instruments (CCD camera, telescopes) and computing equipment (SUNs, UNIX), and from working for Lynn Cominsky were most beneficial.

ROBERT LINSTADT ('93) is a student at California State University, Chico, where he intends to earn a teaching credential and master's degree in physical science.

ART ONWAN ('93) is a graduate student and research assistant in physics at the University of North Dakota.

The most beneficial thing about my education at SSU was the closeness among students and instructors.

MARK ROBINSON ('93) is writing a computerized biofeedback program which is in beta testing. He is also a pre-med student taking classes at Sonoma State University, where he is vice president of the pre-health professions club.

One thing I have picked up during my years at SSU has been the confidence to attack problems. I do know that this has helped me tremendously in pre-med classes.

GEOFFREY SYPHERS ('93) earned his master's degree in energy engineering at the University of Massachusetts, Lowell, in 1995. He developed a concentrating photovoltaic power system for satellites.

DAVID LAMB ('94) is a graduate student at the University of Alabama in Huntsville where he is working towards a Ph.D. in Physics (with a concentration in applied optics) and is currently employed as a research assistant.

My physics education at SSU has proven quite useful. There was not a wasted class, and in less than a year of graduate school I have used at least some of the knowledge obtained from every physics class I took at SSU.

LISA CHRISTENSEN ('94) is in the teacher education program at Stanford University and teaching physical science at Milpitas High School. She expects to complete work for a teaching credential and a master's degree this spring.

REBECCA FREEMAN ('94) will attend graduate school in forensic science at Virginia Commonwealth University in the Fall.

ROBERT LAHADERNE ('94) is a research scientist at Optical Coating Laboratory, Inc. in Santa Rosa.

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