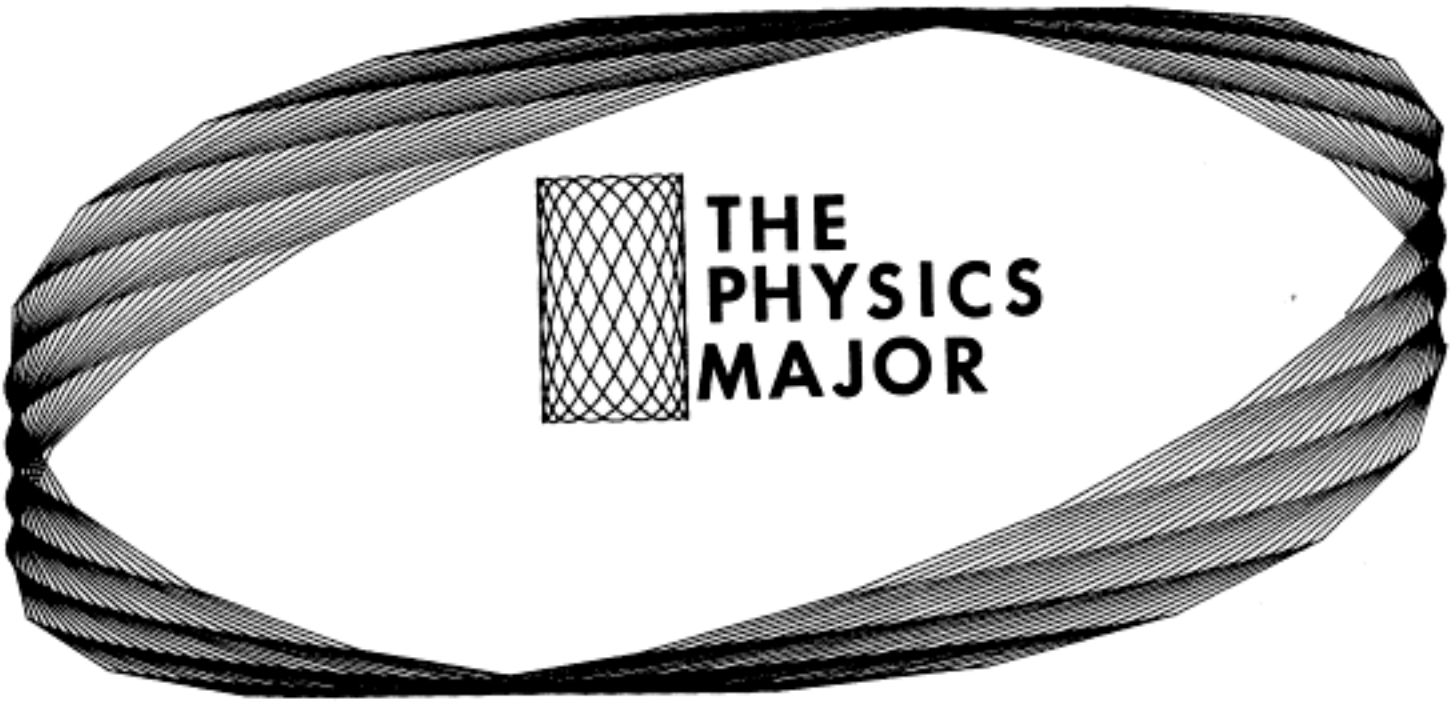

New Professor to be Appointed

The SSU physics and astronomy department is scheduled to get a new permanent faculty member in the fall of 1982.

After a national search for an experimental solid state physicist who would add strength in both teaching and research, the department has recommended the appointment of Dr. Saeid Rahimi.

An expert in semiconductors, Dr. Rahimi is currently a post-doctoral researcher at the Oregon Graduate Center. There he and Dr. John Blakemore are writing a review article on optical centers in gallium arsenide. Dr. Rahimi has previously published research on minority carrier properties in germanium.

At Pennsylvania State University, where he earned his Ph.D. in 1981, Saeid Rahimi was awarded the physics department prize for excellence in teaching as a graduate teaching assistant.

The new faculty member is expected to teach Physics 214, 314, and one section of 216 in the fall. His appointment will partially make up for the losses of professors George Johnston and Isaac Bass in the last two years.

The department looks forward to welcoming its new member.

SSU Students Win Summer Research Positions

SSU physics students continue to win places in highly competitive summer research programs.

Last summer Keith Brister worked at the Oak Ridge National Laboratory. He was one of 83 of the nation's top students selected from 304 applicants to work and learn in Deparment of Energy research facilities. Brister conducted research on gases in solids, especially helium in nickel. He described the project in last fall's "What Physicists Do" series.

Three students have been selected to participate in research in summer 1982.

Geoffrey Wilson, a sophomore majoring in both physics and chemistry, will work on fuel cells at the Argonne National Laboratory.

Joanne del Corral (see student profile elsewhere in these pages) will be involved in high energy physics research at the Stanford Linear Accelerator Center. She also had an offer to work at Argonne.

R. Jeff Porter, a dual major in physics and environmental studies & planning, will work on concentrated photovoltaics for solar energy at Arizona State University this summer. The project is supported by an NSF Undergraduate Research Participation grant.

Sonoma State University

Exciting Courses Scheduled for Fall '82

Due to the increase in the number of physics majors—currently at an all-time high of 98—the department plans to offer a larger than usual number of advanced courses in the Fall 1982 semester.

In addition to the usual required courses in electronics, analytical mechanics, electricity & magnetism, and quantum physics, the following advanced courses are scheduled:

COURSES WHICH USE CALCULUS:

Astronomy 380 Astrophysics: Stars (3 units)
The laws of stellar structure and evolution; how stellar models are made; the formation of elements in stars. This course provides a synthesis of the use of mechanics, electricity & magnetism, quantum and statistical physics—applied to some fascinating problems. It is usually offered in alternate years. Prerequisite: Physics 314. (See instructor if you wish to take these two courses concurrently.) Instructor: Dr. Joe Tenn.

Physics 396 Solid State Devices (3 units)
Survey of physical models and fabrication processes of solid state electronic devices—diodes, transistors, photo-detectors, etc. Offered irregularly. Prerequisite: Physics 314 or consent of instructor. Instructor: Dr. Duncan Poland.

Physics 396 X-ray Fluorescence (1 unit)
Application of this exciting technique to the elemental analysis of thick and thin samples. The theory and practice are presented in five lectures and five graded experimental exercises. The latter involve hands-on use of sophisticated equipment. Prerequisite: Physics 214 & 216 or 210B & 209B. Instructor: Dr. John Dunning.

Physics 396 Computer Graphics (2 units)
An introduction to two and three-dimensional representations of data and objects. Use of PLOT10 subroutines and TIGS. Offered infrequently. Prerequisite: knowledge of FORTRAN. Instructor: Dr. Gordon Spear.

Physics 412 Microprocessor Applications (3 units)
Applications of microprocessors for control and data logging applications. The course covers such topics as microcomputer architecture, assembly language programming, and various hardware and software techniques for data communications and control of laboratory instrumentation. Although the instructor looks forward to greatly improving the course the second time he offers it, the students obviously benefitted from the first attempt last fall. Four of the eight who took it will give papers at the ANBS meeting in May. These papers will describe taking and transmitting data from the x-ray laboratory to a main-frame computer, taking acoustical spectrum data for music halls, and measuring reaction times for a psychology laboratory. Prerequisite: Physics 312. Instructor: Dr. Richard Karas.

Physics 425 Mathematical Physics (3 units)
This course will include coordinate systems, introduction to complex algebra, series solutions to differential equations—including derivation of Legendre polynomials, Bessel functions, etc., numerical methods, orthogonal functions and expansions, linear vector spaces, fourier series and transforms, complex analysis, and calculus of variations. Other topics which may be covered include Green's functions and tensors. Usually offered in alternate years. Prerequisite: Math 231, Physics 314 or 320. Instructor: Dr. Joe Tenn.

COURSES WHICH DO NOT USE CALCULUS

Astronomy 303 Extraterrestrial Intelligence and Interstellar Travel (3 units)
Theories of the origin of life, conditions for extraterrestrial intelligence, the search for extraterrestrial intelligence, problems of communication, spaceflight and interstellar travel. Prerequisite: Astronomy 100 or 200. Instructor: Dr. Gordon Spear.

Physics 333 Precision Machining for Experimental Physics (1 unit).
Techniques of precision machining as employed in the fabrication of experimental scientific apparatus. Use of the lathe and milling machine; working properties of metals and plastics; conventions of design drawings. Prerequisite: Advanced standing as a physics major or consent of instructor. Instructor: Mr. Bill Archuletta.

Physics 350 Descriptive Relativity and Quantum Physics (3 units)
Relativity and quantum physics. Topics such as time dilation, the twin paradox, Lorentz contraction, general relativity, black holes, wave-particle duality, Heisenberg uncertainty principle, elementary particles, superconductivity, and superfluidity. Prerequisite: Physics 100 or Astronomy 100. Instructor: Dr. Duncan Poland.

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Society of Physics Students

The SSU chapter of the Society of Physics Students (SPS) has been active this year.

The chapter held a Halloween party at the home of Berle Beliz, where Berle's Willowside Vineyards products were sampled and unanimously admired. Members also toured the Stanford Linear Accelerator Center in January.

Some of the Department's graduates have been asked to come back to talk to the SPS members about their careers. First to do so was Bill Kramer. Since earning his BA in physics and English at SSU in 1977 Bill has studied electrical engineering at CSU, Sacramento, taught electronics at Santa Rosa Junior College, and worked at National Controls, Inc., where he is an electronics engineer. His talk, which dealt mostly with his work at NCI, was well received by a large audience.

Coming May 14 is a talk by Lynn Hubbard, currently a postdoctoral researcher in physical chemistry at the University of California, Berkeley. A 1975 graduate of the department, Lynn earned her Ph. D. at UC, Riverside.

Don Martin and Mike Helm have led the SPS chapter this year. New members are always welcome. Members receive Physics Today, an SPS newsletter, and free admission to meetings of the American Physical Society.

Grads Win Assistantships at Top Grad Schools

Two of the department's 1981 grads decided to enter graduate schools directly upon graduation. Both accepted assistantship offers at what is often called the nation's top graduate school—the University of California, Berkeley.

Mary Silber intends to specialize in experimental physics. She turned down fellowship and assistantship offers from Columbia, Cornell, Harvard, M.I.T., and Wisconsin because the breadth of opportunities at Berkeley appealed to her.

Silber entered graduate school with a considerable amount of research experience. She was a summer research participant at the Stanford Linear Accelerator Center (SLAC) twice. In addition she spent her senior year as a member of a research group at SLAC. She took several of her general education courses at nearby junior colleges while there, and she took her last physics course at SSU in absentia.

The year away obviously didn't hurt. She graduated with distinction, was the student commencement speaker, and won the SSU Alumni Association's Ambrose Nichols Scholarship for 1981.

Mary came to SSU as a freshman from Del Mar, California. Her father is a music professor at UC, San Diego.

Richard Montgomery graduated from SSU in both mathematics and physics in January 1981. His spring activities included marriage to math student Judy Amiratti and a kayaking trip to Chile. (Richard is a champion kayaker.)

Montgomery intends to specialize in mathematical physics in the math department at Berkeley. He turned down offers from Stanford, Dartmouth, and the University of Washington. His interests include dynamics and turbulence. He has applied his theoretical skills to the kind of turbulence found in white water river running, and he gave a well-illustrated talk on the subject in the "What Physicists Do" series.

A high scorer three times in the prestigious Putnam Competition in mathematics, Montgomery finished 319th out of more than two thousand of the nation's best math students last year. He entered graduate school with an edge over his fellow students: last June he took—and passed—the department's tough qualifying exam.

The move to Berkeley was a return home for Richard. His father teaches at Cal.

THREE MORE THIS YEAR

It appears that three 1982 graduates will enter graduate school this fall.

Kitty Chelton graduated last year in both physics and biology and has spent this year working at Tegal in Novato and taking more chemistry courses at SSU. She will enter the graduate program in biophysics at the University of California, Davis. She may earn a doctorate in that field, but transfer to a medical school is a likely alternative.

Kitty came to SSU from Atlanta, Georgia.

David Munton intends to earn a doctorate in theoretical physics. He has accepted a teaching assistantship offer from the University of Texas in Austin. He had similar offers from the University of Oklahoma and the U. of Iowa.

A transfer student from College of Marin who commutes from the family home in San Anselmo, David is interested in plasma physics and general relativity.

Keith Brister expects to specialize in experimental solid state physics at the University of California, Berkeley. He should have an easy time as a teaching assistant after three years of tutoring math and physics at the learning assistance center in the library.

Keith, who was also offered an assistantship by the University of Illinois, came to SSU from Foothill College in Los Altos. A Palo Alto native, he previously studied music at Cabrillo College.

All five of the graduates named in this article graduated or will graduate with distinction.

Interfacing Computers for Fun and Profit

by Michael Helm

(Editor's Note: Mike Helm will receive his B.S., with distinction, in physics in August 1982.)

When I came to Sonoma I had only the vaguest idea of what I wanted to do with a physics education. I was interested in engineering, but I didn't know anything about it, and I wasn't sure if I was right for it. I was never really handy or interested in working in the shop—my wife is the mechanic in our house. She enjoys working on cars and building furniture; I find them chores.

I was interested in electronics, but never felt a real pull towards building projects. Theoretical physics is interesting, but it demands more talent than I have to offer.

I was drifting until I managed to get an interesting job last summer.

I worked for the Superconducting Magnets group of the accelerator research division at the Lawrence Berkeley Laboratory. This group was investigating better methods for making superconducting magnets for large particle accelerators.

The group was developing and testing new designs for the dipole magnets to be used at the new Brookhaven accelerator called ISABELLE. These magnets must produce a field strength on the order of five to eight Teslas to be practical; this is a very strong field for a dipole-type magnet.

At "quench" time, the magnets are subject to tremendous forces; if not built properly, they self destruct.

I spent the summer setting up a test facility (ovens, Dewars, a multi-channel analyzer and computer, and a crushing machine) to prestress and analyze the behavior of the wires. The type of wire used changes constantly, but the engineer is now able to test samples of the wires and pick out the best prestress procedures.

After the wire-testing station was developed I worked on some other projects. The group had recently purchased a HP 1000 minicomputer to drive the magnet test facility. This machine was something of a mystery to everyone there, and my boss, who had been trained by H-P to run the machine, didn't have the time to work on it.

So I was the one who went to the mat with the computer. I wrote some of the device-drivers for the test facility's sensors, and I wrote programs to enable this computer to talk to the other microcomputers scattered around the shop.

I suppose that's the origin of my interest in projects like that. I'd never done anything quite like it before, although I'd done plenty of programming.

Getting a computer to run a piece of equipment is entirely different from using a computer to analyze data. At first glance the problems seem trivial—just "read" a port, or make a voltage go high or low—but they seldom turn out to be simple. You can't ignore any factor in the computer's environment—its speed, its "architecture," the kinds of interface available, and more.

Back at Sonoma State I've been developing a system of programs to permit communication between the physics and astronomy department's Apple II's and the computer center's systems, using the RS-232 lines in Darwin Hall.

The campus Apple user will be able to use the Apple as a terminal for talking to the large computers while simultaneously using the full facilities of the Apple: disc, printer, memory, and whatever else might be connected to the Apple. The experimenter will be able to drive his experiment and transmit his data to campus computers and also make an immediate copy on the disc.

Interfacing is fascinating and exciting. There is real satisfaction in getting something to work right. Not only did I find out about interfacing last summer, but I learned that there is a real need for people who can do this kind of work.

There are a lot of programmers around, and there are a lot of technicians, too, but there aren't nearly enough people with sufficient skill in both areas.

I hope to get a job connecting computers to the real world after I graduate.

OCLI Now Largest Employer of SSU Physics Grads

Of the 112 Sonoma State University physics graduates, six work for Optical Coating Laboratory, Inc. in Santa Rosa.

All are engineers.

Last summer Tim Engel, John Hall, and Bruce Kuhlman joined Ed Knudsen, Mike McBride, and Basil Swaby at the world leader in thin film optical coatings.

Engel, who received his B.S. in 1980, returned to Sonoma County after working a year at Ford Aerospace & Communications in Sunnyvale.

Hall, also a 1980 graduate, had previously been in the teaching credential program at SSU.

Kuhlman has worked for OCLI for several years. His promotion to engineer came the day after his graduation in 1981.

OCLI replaced Lockheed as the largest employer of SSU physics grads. Ken Aline, '81, recently joined Ronald Bleau, '79, David Hawk, '77, and Larry Seward, '77, at the Sunnyvale aerospace giant. Aline is an associate engineer in the Materials and Processing lab.

Temporary Faculty Enrich Department

Part-time and full-time temporary faculty are bringing new expertise to the SSU physics and astronomy department this spring.

The number of temporary instructors actually equals the number of permanent faculty: there are six of each.

Unusual circumstances contributed to this situation. When Dr. Isaac Bass resigned late last summer, Dr. Peter Lucke was selected to fill his position for the current academic year. And when Dr. Richard Karas was suddenly called upon to become acting dean of the School of Natural Sciences for the spring semester, a number of changes were made, starting with the drafting of Dr. Duncan Poland to be acting department chairman for the semester.

Dr. Lucke, an astronomer who came to SSU a year ago from the Geneva Observatory in Switzerland, is teaching two courses each in physics and astronomy. His presence makes it possible for the department to offer both beginning and advanced astronomy laboratory courses this semester. He has devised a number of new demonstrations for descriptive physicss and has also contributed to the public viewing night program at the campus observatory.

Also full-time this semester is Dr. Tom Barnebey. Tom is well-known in the department, having taught a number of times over the past eight years. Dr. Barnebey continues to operate his own business, Sound Solutions acoustical consulting services, in Santa Rosa. He gave an invited paper, "Practical Acoustics, or A Physicist's Innocence Lost," at the American Association of Physics Teachers meeting in Sacramento April 23.

Dr. Barnebey has several students working on independent study projects in acoustics.

One of the department's early graduates, Niles Severy, B.A., physics and mathematics, '71, is back this spring as an instructor for three laboratory classes. Niles, who earned his master's degree in geology at the University of Colorado, worked several years as a consulting geophysicist. He is also teaching physics part-time at Santa Rosa Junior College.

Students in Physics 214 this semester have an enthusiastic teacher. Dr. Lynn Cominsky, who is also a post-doctoral researcher at the Space Sciences Laboratory of the University of California, Berkeley, recently received her Ph. D. in physics from the Massachusetts Institute of Technology.

She described her research, both theoretical and experimental work on x-ray bursters, in a "What Physicists Do" lecture March 8. She is currently writing a proposal to manage a forthcoming satellite, the Extreme Ultraviolet Explorer, from Berkeley. Dr. Cominsky has the background for it: she helped run the SAS-3 satellite as a graduate student at M.I.T.

"I find that the students here are far nicer than any students that I went to school with," reports Dr. Cominsky. "It's really good that I have only 35 people in my class. I get to spend a lot of time with everyone and to get to know the students. At Berkeley I would have 200 in a class."

Dr. Dennis Parker has an article of his own elsewhere in these pages.

And Bill Archuletta, director of the machine shop at Optical Coating Laboratory, Inc., is teaching the precision machining course Monday evenings.

Student Profile: Dan O'Donnell

by Jay Noceto

"I wanted a small northern California school, near the ocean but not in the city," says senior physics major Dan O'Donnell, explaining his decision to attend SSU.

Sonoma State suited Dan academically also, so he came here as a pre-med student majoring in Chemistry.

"But two explosions in organic chemistry lab and the Physics 210 course convinced me to change my major. Physics is a much cleaner sport."

In his hometown, Camarillo, Dan learned to SCUBA dive at the age of fourteen. By the time he was nineteen he was a lifeguard and dive master, working the Channel Islands off the Santa Barbara coast. He also spent time diving for abalone and sea urchins.

Dan will graduate this June with a B.A. degree in physics. He has decided that, financially and intellectually, it is time to move on.

Where? Back to diving.

Dan—already well versed in diving skills—will enter a two-year program in technical diving in Santa Barbara. "I hope to get into diving engineering—doing research and development on submersible equipment and diving systems. It will give me a change to use my brain, my degree, and my diving."

Dan believes his overall exposure to hands-on physics will assist him in his new pursuits. Diving engineering is not his ultimate goal, however. He talks of graduate school, "Optics is what I'd study. Light and lasers—what we see—intrigues me."

Not surprisingly, optics, lasers, and electronics have been his favorite courses. "It's all great. It explains everything!"

Dan has praise for the education he has received at SSU: "The strong point of the department? The flexibility. You can get anything you want from physics here, from classes that supplement your biology to the B.A. program to the B.S. The faculty, too. Yes, the faculty and the program they've designed for the students."

Student Profile: Joanne del Corral

by Mary Waterman

Sonoma State University student Joanne del Corral, 28, will graduate next year with a Bachelor of Science degree in Physics. She was drawn to the study of physics by her interest in mathematics.

Joanne explains, "I enjoyed the mental stimulation associated with mathematics, and once I had taken calculus, a physics course was the obvious next step because it involved the application of calculus."

Joanne took that next step, but it was not an easy one. "I almost dropped out of the introductory physics class because it was so difficult to understand," she recalls, "but instead of quitting, I struggled through the course and eventually learned how to study physics."

"I had never tested myself like that before, and it was very satisfying when I finally did understand," she adds.

Joanne's perseverance paid off. She is now on the Dean's List, and she plans to attend graduate school.

At this point in her studies, Joanne is primarily interested in research. She wants to devote her energy to expanding the boundaries of present knowledge. Her ultimate goal is to do reseach is particle physics.

Joanne's interest in this particular field is also inspired by the mathematical connection. She is intrigued by the fact that certain mathematical constructions predicted the presence of sub-atomic particles which were subsequently discovered in laboratory experiments.

"These models showed the physicists where to look for the particles," she explains.

Joanne plans to do research work this summer. She was offered a student research position with the Argonne National Laboratory in Chicago to work on either a drift chamber to detect neutron and proton decay or on another project examining the dependence of nuclear spin on proton and neutron collisions.

But she turned down the offer. Instead Joanne will spend the summer in the Stanford Linear Accelerator Center's Summer Science Program. At SLAC she will participate in a research team and also take several short courses offered by SLAC staff and visiting scientists. Approximately 30 students are accepted each year from throughout the nation for this highly competitive program.

Until recently, Joanne worked part-time as a psychiatric technician at Sonoma State Hospital while attending school. She received her license in 1975 after completing the psychiatric technicians program at Santa Rosa Junior College. After working full-time for a year, Joanne returned to college. "I realized that I did not want to do that work for the rest of my life," she says.

With the aid of student loans, Joanne is able to devote full-time to her studies this year.

Joanne lives in Cotati. When she is not studying she enjoys historical novels, tennis, and the video game, "Tempest."

Miriam Carolin Graduates

When Miriam Carolin graduates in June 1982 she will set a number of records.

She will be the most prolific researcher the department has produced.

She will be the first person to graduate from the department with a perfect 4.00 grade point average.

She will be the first student in the noncalculus B.A. program to be awarded graduation "with distinction" by the department.

And, at 54, she will be the department's oldest graduate to date.

Miriam has coauthored six papers presented at meetings of the American Astronomical Society and the Astronomical Society of the Pacific. Two were with Dr. Joe Tenn, and four were with Dr. Gordon Spear. These papers included the results of research in analysis of stellar spectra, photoelectric photometry of variable stars, photography of a nova, and photographic photometry.

She also presented a paper at a regional meeting of the Society of Physics Students held at SSU in 1978. And for more than three years she has made weekly sketches of sunspots while observing them through the Celestron 14.

Miriam's first degree was in history at the University of Cincinnati. After years devoted to raising her family she discovered astronomy—first at Santa Rosa Junior College, then at Sonoma State University.

In addition to helping out on many public viewing nights at the SSU Observatory, maintaining the observatory log and the department archives, writing a number of useful computer programs, and preparing coffee before the "What Physicists Do" lectures, Miriam has made other contributions to the department.

Over the past several years she has visited more than twenty elementary schools to show slides and talk about astronomy.

The Department wishes her well and looks forward to seeing her around the observatory for many more years.

Astrophotography Enhanced

by Mary Waterman

The physics and astronomy department at Sonoma State University has received a piece of equipment which has made it easier for astronomers to photograph distant galaxies and clouds of interstellar gas and dust.

The device is a film hypersensitization chamber. It was donated to the university by Berle Beliz, a Sonoma County vintner and part-time physics student at SSU. He constructed the chamber and is developing procedures for treating several types of film as an independent research project in astronomy.

Film treated in the chamber is far more sensitive to light than untreated film, and the ability to produce supersensitive film will extend the capabilities of the astrophotography equipment at the observatory.

Beliz, who has attended SSU for the past two years, thinks of himself as an astronomer, rather than as a winemaker. He became a part-time students after a long-dormant interest in astronomy was rekindled by endless hours of driving a tractor in his 24 acre vineyard west of Santa Rosa.

"I hate driving a tractor, and I decided there must be more to life than this," he explained. Berle started by reading popular astronomy magazines. "I read everything I could understand, and then I realized that with more education I could increase my knowledge of physics and astronomy and have access to far more information on the subject from more technical journals," he added.

Berle has taken two or three classes every semester since then. He is enthusiastic about the physics and astronomy program at SSU. He pointed out that he is just one of a number of students who have the opportunity to participate in special projects.

"Many students are given the key to the observatory so they can do independent research projects with Dr. Gordon Spear and other faculty members. I don't know if other universities let their students get so involved with the equipment," Beliz commented.

Berle decided to build the film treatment chamber while he was involved with one of the long-term research projects being conducted at the observatory. The project is to monitor the change in brightness in a particular type of galaxy known as a Seifert Galaxy. These galaxies have unusually bright and flickering centers.

If the observations eventually reveal a pattern in the flickering, they could lead to a better understanding of these unusual galaxies. Beliz explained that a Seifert Galaxy has a small, variable source of energy at its center which is capable of producing energy equal to or greater than the combined energy of all the stars in the galaxy. Astronomers do not know what could be producing such incredible amounts of energy. However, they do know that it is not a group of stars.

To record the changes in brightness, students photograph the galaxies on a regular basis. Beliz said that sometimes, with regular film, the camera is not able to produce photos of the dim galaxies. There is simply not enough light to expose the film.

The difficulty encountered in photographing the Seifert Galaxies inspired Beliz to construct the film hypersensitization chamber. He based the design of the chamber on specifications contained in recently published articles in Sky and Telescope magazine and the American Astronomical Society Photo-Bulletin.

He was aided in the project by Dr. Spear. Beliz purchased some parts and borrowed or salvaged others from university equipment in order to build the chamber.

The chamber is used to bake film for extended periods in a gas consisting of 92 percent nitrogen and eight percent hydrogen. Temperatures in the special oven range from 86 to 122 degrees Fahrenheit.

One type of film which Beliz baked for six days become 16 times more sensitive to light but still produced high quality, fine grain negatives.

Comparable photographs of several faint objects taken with both commercial film and treated film show that the treated film records many more stars and increased detail in nebulae, which are clouds of gas and dust.

Beliz said that student Claude Plymate used the treated film to make an excellent detailed photograph which revealed the shape and structure of the Crab Nebula. Previous attemps to photograph this object using regular film had produced an image which was nothing more than a fuzzy faint point.

When Berle is not attending school or working on his astronomy projects, he grows Chardonnay, Zinfandel and Pinot Noir grapes and produces award winning wines at his Willowside Vineyards winery. He received a silver medal for a 1976 Zinfandel and a bronze medal for a 1977 Pinot Noir at the Sonoma Harvest Festival.

Alumnotes

Keith Soreng, '81, recently returned to campus as a recruiter for his employer, Fairchild Semiconductor. Now a product marketing engineer at the San Rafael firm, Keith was asked to recruit more employees like himself.

Scott Anderson, '77, is president of Sonoma Softworks, a software company in Occidental. He writes that "physics is invaluable in computer simulations and modeling."

Peter Conwell, '76, is working on a Ph.D. in physics at the University of Utah. His research is in particle identification using spectral analysis. A teaching fellow for four years, Conwell was director of the undergraduate physics laboratory last year and is now working as a research associate in the bioengineering and electrical engineering departments at Utah.

Student Profile: Jim Pisano

Jim Pisano is fascinated with astronomy. He came to SSU because he had heard of its excellent undergraduate astronomy program while still at Sacramento City College.

In his years here he has taken both introductory and advanced astronomy laboratories, two semesters of astrophysics, and "about ten units of independent study."

His main research activity is the Seyfert galaxy program. "Seyferts" are galaxies with bright central nuclei, thought by many astronomers to be a link between normal galaxies and quasars.

"We are monitoring the variability of NGC 5548," Jim explains. He and a few other students are regularly photographing the distant object with the 500 mm astrograph mounted on one of the SSU Observatory telescopes.

The group, which is led by observatory director Gordon Spear, started measuring the negatives with the microdensitometer in Darwin Hall. But they ran into problems. "The differences (in film density) that we are trying to measure are at or below the noise level of the densitometer," Jim notes.

The solution was to use state-of-the-art equipment. Together with John Dotta and Dr. Spear, Jim is now spending many Saturday nights at the University of California, Berkeley, using the Perkin-Elmer PDS system. This machine, which is connected to its very own PDP 11 computer, makes it possible to make measurements to within a tiny fraction of a magnitude.

Jim is committed to the research. "We hope to learn about short-period variability," he points out. "Only long term behavior is known at present. We have a number of observations of another Seyfert as well. We will measure it soon."

Jim has several individual projects going. He is interfacing an Apple computer to the observatory's photoelectric photometer. When this is finished it will be possible to take data simultaneously from the photometer and an internal clock, storing the data on a disk.

Asked what this will mean, Jim becomes ecstatic. "No more writing down numbers! No more listening to WWV!"

Pisano has spent many nights at the campus observatory. The summer before last he developed a star plotting computer program which is now on the campus Cyber system. This program reads astronomical catalogs and generates finder charts—maps of small regions of the sky used at the telescope eyepiece to find a desired object.

The program can also plot larger regions. It has been used by Dr. Spear to make constellation maps.

Jim is also working on a third project. With Tom McMahon and Dr. Duncan Poland he is trying to get the radio telescope on the roof of Darwin Hall into operation. He and Tom are the third generation of students to work on this. (It was started years ago by Clyde Underwood and Jim Severdia, and it was improved by Paul Vanderbilt.)

This year Jim and Tom built a new antenna to operate at 410 MHz. The old antenna worked at a frequency which turned out to be that of a very powerful radar transmitter at Point Arena—easy to detect but uninteresting astronomically.

In addition to all the projects Jim is taking quantum physics, theory of light, and the computer language FORTH. He will graduate in June. What next?

"I would like to work for a year or two, then go to graduate school, perhaps in computer science," Jim replies. He was particularly intrigued by the recent "What Physicists Do" lecture on robotics by Dr. Charles Rosen.

"What I have learned here gives me a perspective of computer science that computer science majors probably don't have—hardware and software in one unified package."

"I think one of the most valuable things I have gained at this school is the ability to do scientific research on my own, to discover physics for myself without having a teacher show me everything."

North Bay Scientists Meet

by Jacques P. Schlumberger

Melvin Calvin, University Professor of Chemistry at the University of California, Berkeley and Nobel laureate, presented the keynote address at the first annual meeting of the Association of North Bay Scientists. One hundred eighty-three representatives of ten institutions attended the May 9, 1981, meeting at Sonoma State University. Following Calvin's talk, participants attended a variety of sessions, hearing presentations in biology, physics, astronomy, chemistry, geology and mathematics.

In his address, entitled "Energy Plantations," Calvin spoke of his current work in extracting oil from green plants.

He spoke of rubber trees in Brazil and Malaysia. The sap from these trees contains hydrocarbons which are strikingly similar in structure to fossil petroleum. Economics is king, however. The profits in rubber are greater than the profits in oil production from the sap of rubber trees.

The problem, then is to find another variety of plant whose hydrocarbon-containing sap could easily be extracted for oil. This Calvin found on his doorstep. The gopher plant of the genus Euphorbia grows on his ranch near Healdsburg. Not only does its sap contain a high concentration of hydrocarbons, but it grows readily on marginal agricultural land.

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North Bay Scientists Meet

cont. from p. 8

The oil extracted is a crude oil which must then be refined. The carbon structure is in the C_{30} form. It would simplify matters greatly, Calvin suggested, if the structure were of the C_{15} form similar to diesel oil.

During a recent trip to Brazil, Calvin was given a small jar of sap from the copaiba tree. It was clear and looked like olive oil. Chromatographic analysis indicated not only the C_{15} structure in the hydrocarbons, but also an enzyme called farnesyl pyrophosphate cyclase, which induced the hydrogen and carbon atoms to take on the C_{15} forms.

Calvin proposes to extract the enzyme from copaiba cells and, via a delicate and complex process, to introduce the messenger for the enzyme into the genetic information of a Euphorbia cell. This cell would be the parent of a new variety of the old gopher plant containing the enzyme and the preferred C_{15} structures. It has never been done before, but Calvin looks forward to the challenge.

After Calvin's lecture participants attended different presentations centered around their particular fields.

Special events in the afternoon included poster presentations in the lobby of Darwin Hall, tours of the SSU Vertebrate Museum, and demonstrations of low temperature quantum phenomena in liquid helium by students of the Department of Physics and Astronomy.

Five papers were presented by members of the SSU department of physics and astronomy:

"A Recent Determination of the Short Period Photometric Variability of the Be Star 28 Cygni," Jim Mills, Jr., Stephanie A. Snedden, and Gordon G. Spear.

"A Small Research Spectrograph for a Celestron 14 Telescope," Brett Morgan.

"Observations of Optical Variability of some Seyfert Galaxies and a Comparison with Theoretical Models," Jim Pisano and Gordon G. Spear.

"Analysis of a Multiple Spectroscopic Binary System, HD 140629," Peter B. Lucke, SSU; and Michel Major, Geneva Observatory, Switzerland.

"Strong Evidence for the Spatial Attenuation of Experimental Telepathy Indicating a Biogenic Electromagnetic Source Operating in the 0.1 to 100 Hertz Frequency Range," Fredric Blau.

Brett Morgan and Jim Pisano were presented Special Commendations for outstanding papers.

This year's meeting of the ANBS will be held at College of Marin on Saturday, May 8. Several physics and astronomy students and faculty are expected to participate.

Medical Physicist Joins Faculty

by Jay Noceto

Students who haven't had Dennis Parker as a teacher probably wouldn't recognize the tall, dark-haired instructor. Dr. Parker works days at the University of California, San Francisco medical center and teaches at SSU just two evenings per week.

Shortly after receiving his Ph. D. in medical physics from the University of Utah, Dennis ventured west to do post-doctoral studies at UCSF. A strong computer emphasis at Utah enabled him to embark on research in computed tomography (CT, formerly known as CAT).

CT is a diagnostic tool that enables physicians to use x-rays to find anomalies in tissue density. (Dr. Parker gave numerous examples of its use in his March 22 lecture in the "What Physicists Do" series.) Currently the technique is being used for cranial examination, an area where other diagnostic examinations are ineffective.

Eventually Dr. Parker hopes to implement nuclear magnetic resonance (NMR) as an additonal diagnostic tool, one which will be preferred for many applications because it does not involve ionizing radiation.

At SSU Dr. Parker is a lab instructor; he has taught physics 116 and 209A and is currently teaching 116 and 216. He expresses admiration for the structure and organization that have gone into the introductory lab sequences. He remarks that he enjoys teaching 216 more than 116 because the electricity and magnetism course emphasizes more conceptual physics.

"The job of a teacher is to show the student how to learn and to provide the student with the motivation to learn," according to the enthusiastic instructor. He is impressed with SSU undergrads. "They seem to be highly motivated; they're older and know what they want from their education."

Alumnotes

David Nielsen, '74, a scientist with the U.S. Environmental Protection Agency, Las Vegas, coauthored the lead article in the 1 September 1981 issue of Applied Optics. He writes, "Thanks to SSU and the tolerance of my former professors, I feel I was given a sufficient background in physics to make a significant contribution to that project."

Roy Skinner, '74, is part owner of Innovative Architecture, Inc., in Calistoga. This is an entrepreneurial business that specializes in developing architecturally unique commercial and residential projects predominantly in the Napa Valley, San Francisco Bay Area, and Los Angeles area. The company consists of several realtors, a real estate attorney, an architect, and several contractors. Skinner is a licensed realtor and a licensed building contractor, and writes that he is about to become licensed as an architect.

Student Profile: Mark Zimmerman

Sonoma State University physics student Mark Zimmerman, 27, will pursue a career in the computer industry after he graduates with a Bachelor of Science degree in June 1982.

Mark is particularly interested in the field of robotics. "I hope to work in my hometown, Colorado Springs, designing and programming robots which are used in electronics manufacturing," he explained.

He should do well. "When I think of Mark Zimmerman I think of the term, 'silent superman,'" says Dr. Richard Karas, who goes on to state, "In terms of scientific ability and performance, Mark rates among the top ten students I have known in my career, and he is absolute tops in modesty."

Mark has completed the three computer-related courses offered by the physics and astronomy department: Elements of Electronics (Physics 311), Elements of Digital Electronics (Physics 312) and Microprocessor Applications (Physics 412).

Mark is currently working on a special project which involves programming an Apple computer to control a system of mirrors. He points out that the project is a simple form of robotics which can be used for a variety of experiments in Dr. Sam Greene's laser laboratory.

Mark entered Sonoma State University in 1978 after having served four years on a nuclear submarine in the Navy. He decided to major in physics because it was his easiest subject. He has been on the Dean's List since he started school. His lowest grade in a physics course was a lone A- in a one-unit laboratory.

Alumnotes

Frank Van Gieson, physics and mathematics, '79, just completed work for his master's degree in materials science at the Massachusetts Institute of Technology. Van Gieson has accepted a position with National Semiconductors in silicon valley and will be back in California by the time this newsletter is printed.

Richard Hertz, '78, is a consultant to the state senate Committee on Elections and Reapportionment, where he puts to good use his expertise with computers.

Bruce Odekirk, '78, expects to complete work for his Ph.D. in applied physics at the Oregon Graduate Center this June. He is working on the electrolysis of water using sunlight with semiconductor electrodes.

Richard Gary Wong, '75, received his doctor of chiropractic degree from the Palmer College of Chiropractic-West in December 1981.

Johannes Raab, '79, recently passed the qualifying exam for his Ph.D. in physics at the University of California, Santa Barbara.