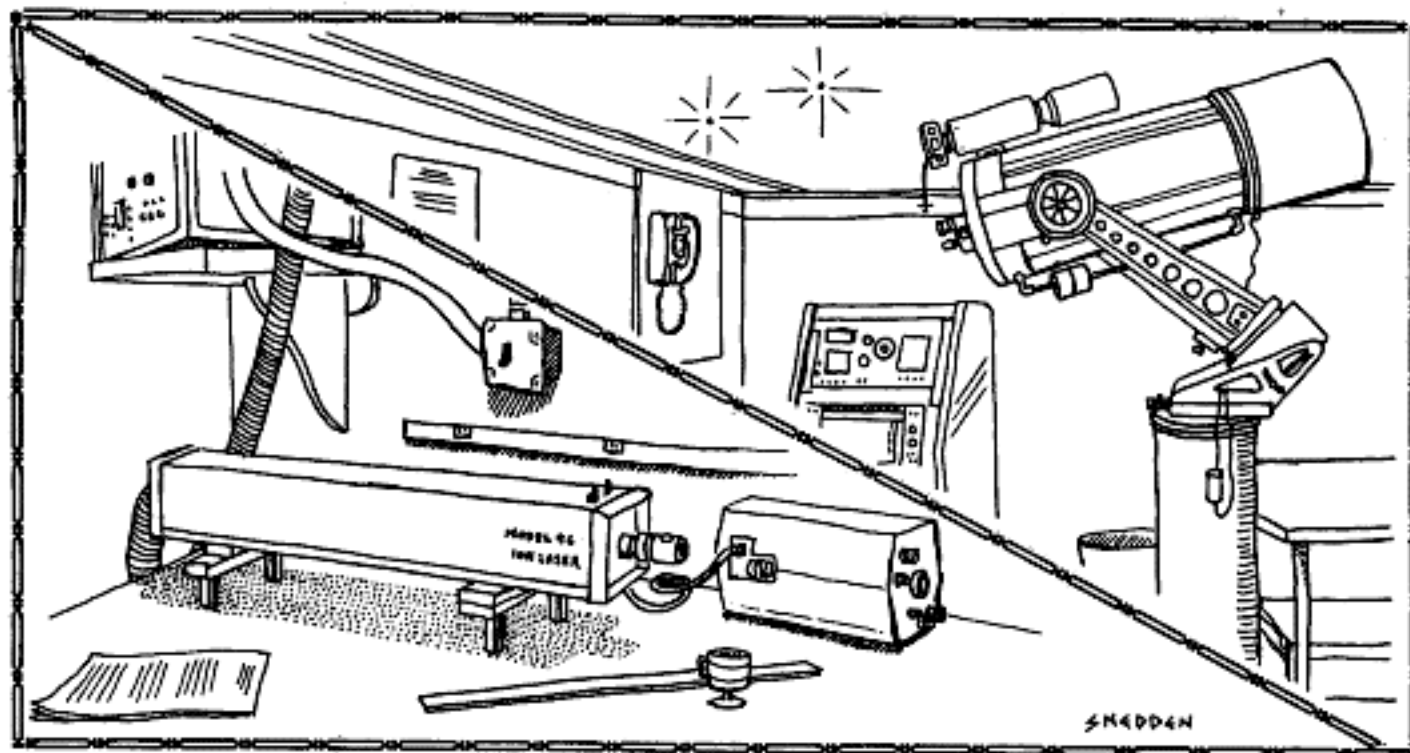


The Physics Major

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AN INTERVIEW WITH THE NEW DEPARTMENT CHAIRMAN

"The first priority of the department is to serve the students by offering them high quality education. All decisions of the department are considered in light of that." Dr. Richard Karas, Chairman of the Department of Physics and Astronomy

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With a new man at the helm, interest is naturally aroused in his ideas concerning the department and its program, his goals, his policies and his attitude toward his new role.

Dr. Karas feels the department can best fulfill its duty to its students by providing them with a rigorous grounding in the basics of theoretical and experimental physics, followed by enough specialized courses to require development of creative applications of those basics to interesting phenomena. Students should also be required to express themselves clearly in writing. Throughout all this, Rich, as we know him, hopes the faculty will continue its policy of open accessibility to students.

Rich believes the department offers an excellent program in experimental physics: in fact, he considers it to be superior to many in the country. Complementing this aspect of the program, Rich considers the theoretical program to be as strong as any.

Rich is aware of many strengths in the department. He feels it is superior in nuclear physics and in astronomy and is particularly strong in optics and electronics. He would like to see the latter two specialties become even stronger with the addition of up-to-date equipment and facilities.

STUDENT PROFILE: ROSS GOODWIN

In June, Ross Goodwin will receive a Bachelor of Science degree with majors in both physics and applied mathematics and computer science. After completing two of the most demanding majors in the college, he plans to enter business school and to earn an M.B.A. before seeking employment in industry.

Although he is an outstanding student now, Ross says that he was not mathematically inclined when he graduated from Montgomery High School in Santa Rosa eleven years ago. He studied briefly at the University of Oregon and then joined the Navy.

Ross served as an electronics technician and as a reactor operator on a nuclear submarine during his six years in the Navy. His most exciting moment came when the U.S.S. Sturgeon scraped bottom near the Virgin Islands. Although submarines are not supposed to do that, his did and survived. Ross assures us that he was not responsible for the accident.

Outside the classroom and laboratory, Ross spends much of his time canoeing. Two years ago, he took a canoeing course from the man who coached the U.S. Olympic team. Now Ross is an authorized instructor himself. He has taught three courses in Sonoma County. If you are interested in learning to canoe get in touch with Ross!

Ross is also active as a Red Cross volunteer. Currently he is teaching cardiopulmonary resuscitation (CPR) for that organization.

Ross is not the first Goodwin to major in physics at Sonoma State. His brother Paul earned his B.S. here in 1971 and then went to the University of Alaska where he completed his Ph.D. in geophysics last year.

SPEAR PUBLISHES PAPER
ON STELLAR ROTATION

Dr. Gordon G. Spear, well known at Sonoma State for his work in observational astronomy, has also conducted research on theoretical topics. "Stellar Rotation and the Thermomagnetic Torque", by Dr. Spear and L.T. Wood of the University of Houston, appeared in Astrophysics and Space Science, vol. 47, p. 341 (1977).

This work was performed at NASA Johnston Space Center in Houston, where Dr. Spear held a Summer Faculty Fellowship in the summers of 1975 and 1976. He also worked at Johnston Space Center as a postdoctoral fellow for two years before coming to SSC in 1974.

KNOW YOUR FACULTY

How well do you know your instructors? Perhaps you would like to learn a little more about them. Here is a brief guide to the physics and astronomy faculty:

TOM BARNEBEY, Lecturer

Tom is from southern California. He earned his B.S. in physics and astronomy and his Ph.D. in theoretical physics at UCLA. A musician and composer, he worked as a professional musician before coming to Sonoma State. He is interested in gravitation and field theory, in many fundamental problems in theoretical physics, and in the physics of music. Since coming to Sonoma State in 1974, he has taught a great many different courses, from Physics 102 Laboratory Physics for the People, which he initiated, to advanced courses in field theory, group theory, and mathematical physics. Tom lives in Bohmert Park with his wife, Jan, who works at the health center on campus.

ISAAC BASS, Associate Professor

Born in California and raised in Texas, Isaac earned his B.S. in chemistry and mathematics at the University of California, Berkeley. From there he went to Columbia University, where he performed experiments in atomic physics for his doctorate. He spent five years at Stanford as a research physicist in low temperature physics before coming to Sonoma State in 1970. Here he has developed several laboratory courses, including the States of Matter Lab and the new course in Gas Lasers and Holography. He is currently dreaming up new uses for the new argon laser and its partner, the tunable dye laser. He served as department chairman from 1974-77. Isaac, Susan, and their two young sons live on an apple orchard in Sebastopol.

JOHN R. DUNNING, JR., Professor

A native of New York, John received his B.S. and M.S. at Yale before earning his Ph.D. in experimental high energy physics at Harvard. He stayed on at Harvard for three years of teaching and research. He came to Sonoma State College in 1968 and promptly switched from high energy physics to nuclear and environmental physics. He is interested in teaching students to detect trace quantities of pollutants and to make analyses with sophisticated equipment. John, whose favorite phrases are "hands-on equipment" and "state-of-the-art", can take credit for establishing three of the laboratories in the department: the mass spectrometer, for which he won a \$25,000 grant; the nuclear lab, heavily used for such techniques as neutron activation analysis each spring; and the x-ray lab, which is shared with the chemistry and

geology departments. He has conducted research in geothermal energy and in coal gasification, and has spent some summers learning new nuclear techniques at the Los Alamos and Oak Ridge National Laboratories. Among his many accomplishments is the creation of an extremely popular Descriptive Physics course which has an environmental emphasis. Off campus, John flies a plane and square dances. He lives in the country near Sebastopol.

SAMUEL L. GREENE, JR., Professor

Sam, who was once a Texan, did his undergraduate work at the Polytechnic Institute of Brooklyn and earned his Ph.D. in theoretical physics at Syracuse University. He came to California to work at the Lawrence Radiation Lab in the early 1960's. In 1966, he became one of the first members of the faculty of the physics department at Sonoma State. He immediately started building the astronomy program. The most versatile member of the department, he has taught at least 22 different astronomy and physics courses, and has initiated many of them. He is interested in just about everything, from theoretical astrophysics, particle physics, and cosmology, to paranormal phenomena and extraterrestrial life. He is willing to entertain and carefully consider any idea on almost any topic. His summers are usually spent in mountain climbing, river running, or traveling around the world looking for possible evidence that the earth may have been visited by extraterrestrials.

GEORGE L. JOHNSTON, Associate Professor (on Leave)

After earning his B.S. in physics at Caltech, George entered Harvard Law School. He received his law degree and then went to work in the aerospace industry in his native southern California. After a few years, however, he returned to school, this time in theoretical plasma physics at UCLA, where he earned his Ph.D. in 1967. He has been on the faculty here since 1968, and has specialized in upper division theoretical courses such as Electricity and Magnetism, Quantum Physics, and Mathematical Physics. He introduced Physics 301 The Relation of Physics to Society and taught it a number of times, critically examining the arms race and problems connected with disarmament, energy, and the environment from the unique perspective of a physicist-lawyer. He has also taught astronomy, including the upper division course in space and planetary physics. He is interested in the development of fusion, as described elsewhere in this newsletter. His wife, Pat, teaches classics at Brandeis University.

RICHARD H. KAPAS, Assistant Professor

The newly-elected chairman of the department is another Californian. He started his education at UCLA but earned all of his degrees at UC Berkeley. His doctorate was in atmospheric and space sciences and was achieved with balloon-borne experiments to probe the earth's magnetosphere and the causes of the aurora. He has done research in Canada, Alaska, and Greenland, and spent a year as a post-doctoral researcher in Norway before returning to Berkeley. There he taught three years in the DICS (Division of Interdisciplinary and General Studies) program and continued his research on the aurora. He also revamped some of the undergraduate laboratories in the Berkeley physics department and wrote Lab manuals for them. He came to SSC in 1974 and quickly achieved great popularity in the Physics 310 General Physics course. He is proud that his students have scored exceptionally high on the Medical College Aptitude Test. Rich also teaches much of the electronics in the department, the environmental physics course, and the history of physical science. Rich and Sandy have built a house on Sonoma Mountain which overlooks the campus. In his spare time, Rich is a glider pilot, a river runner, and a hiker. Much more about Rich may be found in another article in this newsletter.

The senior member of the department is now serving his second three-year term as chairman of the Division of Natural Sciences. This makes him an administrator most of the time, but he manages to teach one or two physics courses each semester and to supervise a few students in independent study projects in electronics. The only midwesterner in the department earned his bachelor's degree at the University of Michigan and his Ph.D. in physical chemistry at Wisconsin. He was awarded a National Bureau of Standards fellowship for two years of postdoctoral research in Washington, D.C. He came to Sonoma State College way back in 1966, when the physics department was just being established. He remembers holding classes in a Rohnert Park apartment building while waiting for the campus buildings to be constructed. A specialist in solid state physics, Duncan is one of the department's electronics experts. He created all of the electronics courses in the catalog and is especially proud of People's Electronics, a course designed for people with no background in science. If you are curious about the strange looking antenna on the roof of Darwin Hall, ask Duncan about it. He has had several generations of independent study students building a radio telescope, and is about ready to have some more students work on it. He lives in Santa Rosa with his wife, Marion, and their two teenagers.

GORDON G. SPER, Assistant Professor

The Director of the College Observatory earned his bachelor's and doctoral degrees in astronomy at the University of Pennsylvania, in his native Philadelphia. The research for his Ph.D. was conducted at Mt. John Observatory in New Zealand, where Gordon was one-half the staff of the isolated observatory for nine months. While a graduate student, he taught astronomy, physics, and meteorology at a nearby college. Afterward, he moved to Houston for research at the NASA Johnston Space Center and some teaching at the University of Houston. There he analyzed ultraviolet stellar spectra obtained from various spacecraft and sailed his boat on the Gulf of Mexico. He came to Sonoma State in 1974 but returned to Houston the first two summers to continue his work with the astrophysics group at Johnston Space Center and to resume sailing on the Gulf of Mexico. His boat has traveled more miles across deserts than on water. He combines his vocation and avocation in the popular course in celestial navigation. He teaches all three laboratory courses in astronomy and many of the lecture courses. Interested in every aspect of astronomy, he also established the course on the U.F.O. phenomenon. In this course he often finds students who do not consider themselves scientifically inclined, but he soon has them making statistical analyses of sightings, often with one of his favorite instruments, the computer. Gordon is on campus nearly every night, but his wife, Barbara, does not mind. She is usually in Darwin Hall, helping to direct the Sonoma Film Institute. The Spers live in Rohnert Park.

JOE S. TENN, Associate Professor

Another southern Californian, Joe did his undergraduate work at Stanford University. Upon graduation, he joined the Peace Corps and was a member of the first group of volunteers to go to Ethiopia. For two years he taught math and physics to tenth graders in Addis Ababa, where he and the other volunteers were welcomed by Emperor Haile Selassie.

From Ethiopia, Joe went to Seattle where he studied low temperature physics at the University of Washington. His dissertation was on the theory of neutron scattering from liquid helium. Joe came to Sonoma State immediately after completing work for his Ph.D. in 1970. Here his interests have gradually shifted so that now he teaches more astronomy than physics. He initiated the courses Frontiers in Astronomy and Discovering the Galaxies, and he is currently teaching the upper division course in astrophysics. He has taken two courses in astrophysics and has spent three summers on research in stellar spectroscopy at the Lick Observatory since coming to SSC. He founded the "What Physicists Do" lecture series and this newsletter. For several years, he has been the advisor for all physics majors. Joe and his wife, Eileen, live in Santa Rosa with their two young children.

STUDENT PROFILE: STEPHANIE SNEDDEN

If you have noticed the observatory schedule posters and admired the strip of art along their left side or have noticed that a new artist has lined the cartoons for the Stony Point Gazette, you have met Stephanie Snedden, the unofficial department artist. Among her other accomplishments Stephanie designed a logo for the physics stockroom stationery.

Stephanie received a B.A. in art practice from the University of California, Davis where she specialized in etching, lithography and painting. Her current interest in art is in illustration. She would like to find the connection between science and art, which she feels are very closely related expressions of the creative process.

After graduation from Davis, Stephanie knew she would like to return to school, but it was not until she took a brace of courses in physics at the Santa Rosa Junior College that she knew what she would like to return to.

Stephanie is glad she came to Sonoma State College. She likes the fact that it is a small college and feels that the interaction between the faculty and the students is one of the greatest bonuses of this department.

Stephanie is vitally interested in astronomy and is one of the stalwarts who keeps the observatory running. She worked on the photometric research into the binary system, VV Cephei, which resulted in a paper presented to the June meeting of the Astronomical Society of the Pacific, and she has spent many hours in astrophotography.

At present Stephanie computes the time and place of moonrise each full moon for the Geysers Peak Winery's monthly moon walks. Stephanie also finds physics fascinating and would not object to working in physics should a career in astronomy not materialize.

If you happen to be in Healdsburg or environs any Saturday or Sunday, note that the face behind the wheel of the local taxi is familiar. But, don't expect a discount, and be prepared to tip. As a member of the underpaid half of the working force, Stephanie believes firmly in the discretionary addition to the base pay.

And expect to see more of Stephanie's illustrations as her fame spreads.

In the first 18 months of its existence, the Sonoma State College Observatory has offered a diversity of programs and events of astronomical interest.

First and foremost, it has provided students of observational astronomy with two first-class telescopes, a Celestron-10 and a Celestron-14, both Schmidt-Cassegrain reflecting systems. These telescopes are designed to provide optical clarity throughout the field of view.

Since its dedication in April, 1976, the observatory has provided the tools for the development of observational skills for students in both beginning and advanced astronomy laboratories.

In the beginning laboratory, Astronomy 231, students have learned to operate the telescopes, to locate near and deep sky objects, to discover the meaning of the astronomical coordinate systems and to understand the several systems of time.

In the advanced astronomy laboratory, Astronomy 482, upper division students have spent long hours at the telescopes, taking spectra and gathering photometric and astrometric data for more intensive research.

Astronomy 331, a class in astrophotography offered for the first time last spring, opened the reaches of the deep sky to many camera fans who learned the techniques for obtaining their own photographs of the wonders of the sky. The Pleiades, star trails, the Orion nebula, constellations, the moon and planets and several galaxies have sat for their portraits.

All three laboratory courses are taught by Dr. Gordon Spear, the Director of the Observatory.

For students who wish to enter the world of astronomical research, Dr. Spear is currently offering a seminar in photometry. Photometry, which may be visual, photographic, or photoelectric, is the measurement of the apparent magnitudes, or brightness, of astronomical objects. Students in the seminar study the methods of photometry, take photometric data, reduce the data, and examine the information revealed about the stars' luminosities, temperatures, and distances.

The group is studying the binary system, VV Cephei, a red supergiant, and its hot, blue companion, which orbit each other with a period of approximately 20 years. The latest eclipse of the blue star by its giant companion began last November and will conclude this spring. Earlier research by many members of the class enabled the group to obtain enough information to present a

paper before the scientific meeting of the Astronomical Society of the Pacific last June.

The observatory is not used solely for class instruction and research, however.

In an effort to reach out to other Sonoma State College students as well as the community, public viewing nights and class visits have been scheduled.

Several classes from public schools in the county and from other departments in the college have scheduled evenings at the telescopes during which the planets and other celestial objects have been observed.

Most popular of all have been the viewing nights reserved for the general public. More than 1500 visitors from all over Sonoma County and from as far away as San Francisco and Ukiah have made the trip to the southeast corner of the football field to discover for themselves Saturn's rings, Jupiter's bands and moons and other exciting phenomena.

From public viewing, to private viewing, to instruction and research. And why not? Where else can you find soft lights, lively music, good friends, spirited conversation and a sky spangled with stars while participating in class activities or research projects?

STUDENT PROFILE: PAUL AVELLAR

Metaphorically speaking, Paul Avellar is the fastest telescope in the west. With the same ease with which others find local classrooms, Paul finds the most obscure objects in the sky. His ability in identifying and locating the best hidden star fields and celestial objects is unparalleled. Paul is an observatory assistant who brings zest and spontaneity to public viewing nights.

At the University of San Francisco, Paul was first introduced to computers and physics. There he also participated in productions of the college plays, winning an award for the best stage lighting. Now, of course, Paul works in the dark.

After a stint in the army, Paul matriculated at Solano Community College where he majored in philosophy and mysticism. He received an A.A. in Liberal Arts from that institution.

Paul came to Sonoma State in 1975 to study parapsychological phenomena. While in the psychology department, Paul served as co-editor of Ubiquity's Interchange.

Astronomy 100 changed his mind. Not only would astronomy and physics provide better career opportunities, he thought, but he was dazzled by astronomy and completely won over by the structure and organization of physics.

Paul's love for astronomy began when he was four years old when he could only look at astronomical pictures in books. Now he takes those pictures. He can be found almost every clear night at the observatory, often between the hours of midnight and dawn (who do you think discovered the baptism by sprinklers that washes over the observatory every morning?), photographing every Messier and NGC object within reach of the 10-inch and the 14-inch Celestrons.

A pair of Paul's photographs of the asteroid, Nysa, was published in the August 1977 issue of the national magazine, Astronomy. This was only a few months after he began photographing the sky in the Astronomy 331 Astrophotography course.

Paul has served as darkroom, astrophotography, and observatory assistant and is now engaged in offering his services as a tutor in astronomy.

Paul feels that the department of physics and astronomy has fine teachers and a lot of potential for growth in its programs and resources.

Paul would like to work in the space program. It is one of his ambitions to design the hyper-drive in 2010 A.D.

Paul feels he can attain the same objective through physics as he originally sought in his study of psychology. He feels he can achieve an understanding of the universe through either discipline, but now he is reaching with a telescope.

STUDENT PROFILE: ERIC REITER

Eric is a first time freshman at Sonoma State. Since high school, 8 years ago, he has involved himself in the creation of alternative energy devices and sculpture. He has now turned to college and physics with more important goals in mind.

His most recent creation is a 17 ft. diameter multi-bladed wind turbine designed to provide a small ranch with its water pumping and electrical needs.

Eric's earlier interests were in the creation of musical instruments which included two sitars. At age 19 he created the sun harp, a sculpture that plays music with light via a lens and some electronics. It has been on display at the Exploratorium for 6 years and has also recently been on display in the Darwin Hall lobby. The harp is made from a whale's jaw bone and fine woods shaped along organic lines. The harp also points out some interesting physics; the motion of the harp strings, in the focal point of light, can be made to present geometric figures such as stars and figure eights.

Eric's next creation (1970) was an eight foot diameter spherical trailer called the Mobile Solar Workshop. It was tapped by a solar electric converter which charged batteries for operation of a machine he designed and built called the Versatile Machine Tool. A vertical shaft, the basis of the geometry of the sculpture, was the axis of the sphere and held the solar converter and the machine tool. The machine tool pivoted and extended from the axis and did grinding and sanding on the rest of the sculpture. Its functional geometry helped build itself. The other message of the sculpture said "we can run our tools on the sun", and it did. It is now in need of repair and a home.

Eric is currently helping to design and build a heliostat and solar display for the lobby of Darwin Hall. He also has his 5 ft. diameter parabolic mirror mold on loan here for student use.

After he learns more physics, Eric plans to study the electromagnetic nature of life.

JOHNSTON STAYS AWAY

Dr. George L. Johnston, Associate Professor of Physics and Astronomy at SSC, has taken a third year of leave from his position.

After two years at the Research Laboratory of Electronics at the Massachusetts Institute of Technology, Dr. Johnston has accepted a position in Sacramento as a special advisor to Commissioner Ronald Doctor of the California Energy Resources Conservation and Development Commission.

Both positions deal with the nation's energy problems. At MIT, Dr. Johnston conducted research in plasma physics, working on theoretical problems related to attempts to build a controlled thermonuclear fusion reactor. He published a number of papers in this area during his two years there.

California's Energy Commission has broad powers. It is working on energy efficiency standards for appliances and buildings, and it is planning the state's energy program for the next few decades. By law, no new nuclear power plants may be built in the state until the Energy Commission certifies that certain questions related to safety and the disposal of radioactive wastes have been met.

NIGHTS OF WINE AND MOONRISE

What can a well-known winery and the department of physics and astronomy possibly have in common?

It all started when the public relations director of Geyser Peak Winery conceived the idea of laying out a short nature walk through the hills behind the winery. As the winery looks out across the valley to the tips of Geyser Peak and Mt. St. Helena, it seemed natural to schedule evening nature walks on nights of the full moon for the express purpose of watching the goddess of the moon rise majestically from behind the peaks across the valley.

And, of course, in order to watch this spectacle, one must know the time and place of moonrise. What could be more natural than to contact the astronomers at Sonoma State College to obtain this knowledge?

Enter Dr. Gordon Spear, who with two of his students, Stephanie Snedden and Miriam Carolin, calculated the moment and location of moonrise since August for the winery walks. As the moon swings north and south in its orbit, the precise point of its appearance each month changes.

Therefore, before the first moonwalk, Dr. Spear and the students spent an afternoon at the winery surveying the opposite hills for altitude and azimuth readings to pinpoint the geographic height and location of each month's lunar appearance. With the aid of the Nautical Ephemeris, this information can be calculated.

And so, each month, on the night of the full moon, and perhaps on nights preceding and following, a band of interested people meets at the winery and takes a pleasant hike along the trail. And at the precise moment of moonrise, the walkers turn and watch from a vantage point on the hill as saffron-robed Diana first chooses her path and then boldly, with great dignity, ascends in her stately progression across the sky. And thanks to Dr. Spear and his students, the walkers know where to look to catch their first glimpse of her glory as the huntress steps forth on her journey.

Dr. Spear and the students were pleased during the first moonwalk to find their predictions accurate within two minutes. It is planned to have an astronomy student accompany future walks. When the moon has risen and the sky has settled into what darkness it can on such a glorious night, the student will point out the stars, constellations and other wonders of the night sky to the participants of these evening walks.

Although the current college catalog lists approximately 38 physics courses and 14 astronomy courses which are regularly offered (plus a few which are about to be deleted because they are not) these are not enough for the active minds of the Department's faculty and students.

The catalog contains two more courses: Physics 396 Selected Topics in Physics and Astronomy 396 Selected Topics in Astronomy. These course numbers are used to offer a great variety of innovative and experimental courses, some of which eventually become regular courses in the curriculum and some of which disappear after one trial.

This year, there seems to be more creativity around than usual--eight 396 courses are being offered. They are as follows:

Fall 1977

Astronomy 396 TOPICS IN ASTRONOMICAL PHOTOMETRY (1 unit) Dr. Spear

An introduction to photoelectric photometry and the SSC Observatory photometer system, this course is further described in the article about the Observatory elsewhere in these pages.

Physics 396 GAS LASERS AND HOLOGRAPHY Dr. Bass 3 units - 2 hrs. Lect., 1 hr. Lab

Topics covered included basic principles of laser operation, cavity design, active medium and population inversion, optical feed back and oscillation, temporal and spatial coherence properties, axial and longitudinal modes; basic principles of holography, wave-front reconstruction, sine grating and Gabor zone plates, recording media and processing, real-time and time-average holographic interferometry.

Physics 396 SOLID STATE DEVICES (3 units) Dr. Poland

Lectures on the physical models used to explain and predict the behavior and operation of solid state electronics, optoelectronic, and energy conversion devices, including diodes, transistors, photodetectors, light emitting and laser diodes, and solar cells.

Spring 1978

Astronomy 396 SPACE COLONIZATION (1 unit) Dr. Spear

Exposition of the ideas of O'Neill, Bernal, Dyson and others on the colonization of space. Gravitation, rocket flight and the Lagrange points; the space shuttle and other space hardware; construction of space habitats; mining the moon and asteroids; industry in space; living in space; solar power stations; projections for the future.

Prerequisite: Astr 100 or Phys 100

Physics 396 THEORY OF GRAVITATION (3 units) Dr. Barnebey

The course will deal with the Newtonian and Einsteinian theories of gravity, emphasizing the latter. The mathematical description of gravitation as a geometrical effect shall be developed, and applications will include calculations of: the bending of light near massive bodies, corrections to the orbital motions predicted by Newton's law of gravity, gravitational wave phenomena, gravitational fields near collapsed objects and black holes, and the solutions to Einstein's equations which yield the Standard cosmological models.

Prerequisites are: One semester each of Mechanics, Electricity and Magnetism, and Differential Equations, or equivalent or consent of instructor.

Physics 396 QUANTUM PHYSICS, MIND, AND ESP (3 units) Dr. Sam Greene

A search for the origins of human consciousness and of its possible extension in extra sensory perception (ESP). An examination of the basic principles of quantum physics and of the current picture of the neurophysiology of the brain leads to an attempted synthesis as a metaphor for consciousness. These two disciplines when combined with the evidentiary aspects of ESP allow an educated guess relative to the future evolution of consciousness. Whether or not we will be successful in understanding consciousness we will at least have examined a number of current theories about it and have traversed considerable parts of quantum theory, relativity, time theory and ESP.

Physics 396 DIGITAL ELECTRONICS (3 units) Dr. Karas

An increasing amount of electronic information processing is being done digitally. That is, information is converted into binary numbers form (combinations of ones and zeros) and processed arithmetically. Not only computers, but most test instruments, and many communications and control systems use this technique.

In this experimental course, Rich Karas plans to cover the fundamentals of binary counting and arithmetic, theorems of digital logic (including Boolean algebra), the characteristics of "families" of logic circuits (e.g. TTL, CMOS, ECL), and many of the most common types of integrated digital electronic circuits (e.g. gates, flip-flops, registers, analog-digital converters). Applications will be stressed. If time permits, Rich will devote the last part of the course to microprocessors and their uses as replacements for other logic devices in controllers and communications gear. The course is open to students who have completed either Physics/Chemistry 311 or Physics 332.

Physics 396 PHYSICS OF SOLAR ENERGY (3 units) Instructor to be announced

Principles guiding the design, construction and use of solar energy devices: Solar radiation, thermodynamics, optics, energy transfer and storage, semiconductor physics for direct electrical conversion, economics and logistics of both small-scale and large-scale solar energy conversion; present and proposed applications, such as space colonization and microwave transmission. Prerequisite: Completion of an algebra/trigonometry level general physics course (Phys 210) or equivalent.

PHYSICS GRADS DO WELL

A survey of Sonoma State College's physics graduates has found them to be a successful group with many of them doing very well in industry, teaching, or graduate studies.

The largest number, 28 of the first 74 graduates, found employment in technical fields upon graduation. Several of these are working as engineers including three satellite control engineers at Lockheed and two product engineers at Space Microwave Laboratories in Santa Rosa.

In each case, the success of the first Sonoma State graduate employed helped ease the way for the second, according to Dr. Joe Tenn, the Department of Physics and Astronomy Advisor who surveyed the graduates.

More than half of the Department's graduates have responded to the survey and several others have been in informal contact with the Department. Most of them mentioned the close contact with the faculty, the small classes, and the opportunity to use sophisticated equipment as reasons for their success and their positive feelings toward the Department.

A substantial number of graduates entered graduate studies upon graduation. Paul Goodwin was the first to complete work for a doctorate, earning his Ph.D. in geophysics at the University of Alaska. Paul, who is part Eskimo and grew up in Alaska before coming to Santa Rosa Junior College and Sonoma State, is remaining in Alaska to work for the state government, helping other Native Americans to enter the sciences.

Bob Steele, Sonoma, just became the second Ph.D. Bob earned his doctorate in molecular spectroscopy at the University of California, Santa Barbara, and is now doing post-doctoral research at the University of Colorado Laboratory for Atmospheric and Space Physics. Bob earned his bachelor's degree in both math and physics in 1970 and stayed at Sonoma State for graduate work in mathematics before going to UCSB.

Ken Larson, Petaluma, did graduate work in information and computer science at the University of California, Irvine before accepting his present position as an assistant professor of mathematics at Southern Oregon State College.

Arnold Christiansen, Laytonville, went to the University of Rochester with a partial fellowship for graduate study in physics upon graduation in 1974.

Several other graduates are now enrolled in graduate studies, including Lynn Hubbard in physical chemistry at the University of California, Riverside, and Barbara Greene in energy and resources at UC Berkeley. Lynn was the only California winner in 1975 of a national fellowship in atmospheric sciences which is awarded to just four entering graduate students each year. She chose to study atmospheric pollution at UCR.

Among those who have finished graduate studies is Niles Severy, Santa Rosa, who earned a master's degree in geology at the University of Colorado and is employed as a geophysicist by a worldwide consulting firm. He has made recommendations regarding the safety of proposed power plant sites in several states, Turkey, and Pakistan.

Several of the Department's graduates have earned teaching credentials and master's degrees and have gone into secondary teaching. Among the teachers are Roberto Ramirez, Healdsburg High School; James Hill, Los Gatos Union High School; John Proud, Seabury Hall, Hawaii; Gregory Seeger, Rincon Valley Christian School, Santa Rosa; and David Kelso, currently teaching in Australia.

Paul Vanderbilt is teaching electronics at San Jose City College, and Steve Williamson has taught at two bay area junior colleges.

Several graduates of Sonoma State's innovative and flexible B.A. program have used their physics background in less traditional occupations.

John Norton, a writer for the Napa Register, likes to write science articles. Another graduate is using her combined major in physics and French in library work. One graduate, a double major in physics and psychology, is earning a doctorate in parapsychology.

Two graduates have combined B.A.'s in physics and management. Michael McBride earned a master's degree at the American School of International Management in Arizona and is now employed as a Junior Sales Engineer at Optical Coating Laboratories, Inc. in Santa Rosa. Andrew McLean, is a manufacturer's representative for a peninsula electronics firm.

Jon Simmonds joined the Navy upon graduation and is now a pilot flying with Antarctic Development Squadron Six. He flies in support of scientific operations there and has done similar work in Greenland.

Robert Lucas, a 1976 graduate in both chemistry and physics, was recently featured in an article in the business section of the Santa Rosa Press Democrat. After completing his B.A., Bob founded his own company, Solar Energy Engineering, and now has five employees helping him manufacture solar collectors.

A health physicist, several people who work with computers, and a number involved in electronics are also found among the physics graduates of Sonoma State.

The Department of Physics and Astronomy is proud of its graduates and is pleased that so many have kept in touch.

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STUDENT PROFILE: SHELLEY RANDALL

Shelley Randall knows exactly what she wants to do after she graduates with a B.A. in physics in June. She intends to work in biomedical electronics, probably in a hospital. She is already working as a volunteer at Santa Rosa Memorial Hospital, assisting the biomedical engineer in maintaining and calibrating equipment.

Not surprisingly, Shelley enjoys her electronics courses. She is currently taking Elements of Electronics from Dr. Richard Karas and the selected topics course in Solid State Devices taught by Dr. Duncan Poland.

She is also very happy with the Environmental Physics Laboratory course. She finds Dr. John Dunning an exciting and stimulating instructor and is pleased to have the opportunity to learn to perform x-ray fluorescence and mass spectroscopy.

A Santa Rosa native, Shelley graduated from Ursuline High School and attended Santa Rosa Junior College. There she became a licensed psychiatric technician. She worked at Sonoma State Hospital for five years, four of them as a rehabilitation group leader, before deciding to return to school to seek a different career.

At Sonoma State, Shelley started in chemistry, then found the B.A. program in physics with the algebra option to be best suited to her goals. She is still interested in chemistry and is taking more courses in that subject.

Outside of college, Shelley plays golf and tennis. She and her husband, a teacher, are currently building a house in Santa Rosa. She enjoys taking part in the construction.

OBSERVATORY REPORT PUBLISHED

For many years, the Bulletin of the American Astronomical Society has published an annual Observatory Report from each of the major observatories in the United States and Canada.

In February, 1978 (Vol. 9, no. 1, p. 246), the Bulletin published the first such report from Sonoma State College. The report includes sections on personnel, instruction, equipment, research, miscellaneous, and publications. It includes descriptions of the department's fourteen undergraduate astronomy courses, quite possibly the largest number offered in the nation, and an account of the construction and dedication of the sliding roof observatory. Seven publications, authored or coauthored by members of the department in 1974-76, are listed.

Sonoma State's observatory report was the only one submitted that year by the California State University and Colleges.

The Society of Physics Students (SPS) is an international organization. In common with the American Physical Society, the American Astronomical Society, the American Association of Physics Teachers, and half a dozen other professional societies, it is affiliated with the American Institute of Physics.

The two-year old Sonoma State College chapter of SPS is becoming increasingly active under the presidency of Candy Sevieri. Local activities include meetings at Cotati "hot spots", other social activities, and field trips. The chapter sponsored a Department picnic recently, and it toured the Loxel factory where the Department's new laser was manufactured. Another field trip, to the Exploratorium in San Francisco, is scheduled for November 23. Details about this trip and all activities will be posted on the third floor of Darwin Hall.

Through the SPS, members receive a subscription to Physics Today, the monthly magazine sent to all members of the physics community, and to an SPS newsletter which features information regarding scholarships and employment opportunities. They also receive discounts if they wish to subscribe to such magazines as Scientific American, Sky and Telescope, and Science News.

If you are interested in joining SPS, call Candy Sevieri at 763-6967 or Stephanie Snedden at 636-4411, or leave your name and phone number in the SPS mailbox in the Department office, Darwin 126.

STUDENT PROFILE: AL NAUDIN

Albert Naudin is a physics student who likes to work with his hands. He is also fascinated by such problems as the origin of the universe and the nature of black holes.

He began studying physics because of his long-time interest in astronomy. Al feels that a good understanding of mathematics and mechanics is essential to understanding physics.

He also has considerable background in electronics. He studied electrical engineering at San Francisco City College, and he acquired electronics skills during three years in the Army. He has repaired stereo equipment and is still a hi-fi hobbyist.

Among Al's other hobbies are photography, sports, and cars. He is active in drag racing and is seriously considering opening an automotive shop at some time in the future. His immediate goals are to complete his B.S. in January, 1979, and then to find employment in experimental physics. By then he will have taken just about all of the laboratory courses offered by the department.

Al lives in Petaluma with his wife and six-year-old daughter. He feels that the best thing about the Department of Physics and Astronomy is the one-to-one relationship existing between faculty and students. He finds the instructors quite helpful.

Certain areas of the program could be improved, however, Rich would like to see funds and released time made available for those faculty members who so desire to initiate research programs with the aid of student assistants. He feels he and his colleagues can best maintain their professional competence through research and would like to see continued recognition of this fact by the college. Although Rich believes research to be extremely important, he does not believe it should supersede teaching.

One of the ways of providing released time for the faculty would be to invite professors from other institutions to Sonoma State for one year visits. These "visiting fellows" would teach some of the department's courses as well as specialty courses of their own, thus providing new ideas toward an enrichment of the program.

Rich would like to see the department enlarge its program in various ways. He would like to see the creation of courses in the development of new solar energy devices along with an understanding of their underlying principles.

He would also like to see the atomic physics, plasma physics and solid state physics programs enlarged and a course in biophysics developed. He feels the department has the personnel but not the funds for the first three programs while both personnel and funds would be necessary for the last named program.

Another of Rich's objectives is the establishment of a new observatory in a location far from the light pollution that is fast overtaking the campus. He would like this observatory to include bigger telescopes, better spectrographic and photometric equipment and proper storage facilities. In keeping with this objective, Rich would like to see the department offer a degree in astronomy.

One important aspect of the department's program is its interaction with the community. The department colloquium, What Physicists Do, continually attracts an audience from the community. Public viewing nights at the observatory have seen upwards of 200 people an evening waiting patiently for a peek through the telescopes.

Rich has some ideas about increasing the aid offered by the department to the community. He would like to see workshops in astronomy, lasers, geothermal energy and other physics topics open to qualified and gifted high school students as well as to junior and senior high school teachers, and summer courses for gifted high school students. Rich would also like to see the department become a resource center for secondary school teachers.

On the subject of growth, Rich stated that he does not perceive growth to be an important issue right now. He feels it more important for the department to strengthen its program at this time and to invite visiting faculty to enrich our program and provide released time for our own faculty.

The eventual establishment of a graduate program in physics is included in the master plan for the college. Rich, however, does not see this as an immediate possibility; in fact, he does not see the inclusion of a graduate program as a part of the physics department as occurring within the next three years. Although he feels benefits would accrue from such a program, he would not like to see the department concentrate on such a program to the detriment of undergraduate students.

Rich discerns and applauds the spirit of innovation that is manifest in the department. He feels innovation is encouraged, citing such

examples as Sam Greene's projected course in Quantum Physics, Mind and ESP; Isaac Bass's re-vamping of the 116 laboratories; and Gordon Spear's research programs at the observatory as well as his courses in UFO's and Space Colonization.

Rich particularly commends the open lines of communication that exist between the faculty and the student body. He has been encouraged to see more and more students attend department meetings and offer opinions.

How does Rich see himself as the department chairman? He says, "I am the elected representative of the department in relations with other departments and the college at large. I'll try to keep the department functioning smoothly and carry out the wishes of the faculty. I shall try to sense what the faculty members want professionally and academically and augment those aspirations." He feels himself to be on a par with the other members of the faculty in decision and policy considerations. He does not give his voice or vote more weight than those of other faculty members.

This may sound fanciful, but Rich does not like to think of himself as the department chair. Rather, he sees himself as the charman. Yes, "char", as in the British charlady, with all the connotations that that particular description brings to mind. So, please, don't squeeze the charman. He has a great deal to do from steering the craft through smooth and stormy waters to mopping up when the bark ships water.

Rich was born in Peekskill, New York. At the age of two he moved to Alameda, California, where his family remained until he was in the fifth grade. At that time, the Karas family moved to the Los Angeles area where Rich remained until he entered college. He received his B.A. and M.A. in physics from Berkeley, and his Ph.D. in Atmospheric and Space Science from that same institution. In 1970 and 1971, Rich spent a year in Norway as a fellow of the Royal Norwegian Council for Scientific Research at the Physics Institute of the University of Bergen where he studied auroral physics. Remember his talk on the aurora for WPD?

Rich has pursued the aurora through Alaska, Canada, Greenland and Iceland as well as through Norway and has taken a student from SSC to Greenland while exploring the secrets of the flickering curtains. He would like to follow this will-o-the-wisp to Antarctica.

On his return from Norway Rich taught at Berkeley for three years before coming to SSC in 1974. It was while Rich was teaching courses in the history of physical sciences in the Division of Interdisciplinary and General Studies at Berkeley that

he formulated his philosophy toward science. He firmly believes that scientists should "understand what physical theory says, be able to apply it, know where it came from historically and philosophically and know what it means to the society around them."

This year, Rich has an additional duty toward the college as a whole. He is a visiting fellow for the National Endowment for the Humanities. In this capacity he conducts a college-wide symposium once a week on the subject of the relation of physics to other studies and presents talks on physical phenomena and allied topics to classes in other departments of the college.

Every Monday afternoon at 4:00, the Department of Physics and Astronomy gathers in Darwin 108 to hear a lecture, watch a film, or see a demonstration on some topic in the physical sciences.

This is the fourteenth semester for the popular "What Physicists Do" series. As is almost always the case, the series is being directed by its founder, Dr. Joe Tenn.

To most regulars, the high point of this semester's series was reached Nov. 7 when Dr. William M. Fairbank, a prominent experimental physicist at Stanford University, explained why he believes that he and his graduate students have found quarks in matter.

There was considerable interest in the two lectures on extraterrestrial intelligence. On Oct. 3, Dr. Jill C. Tarter came from NASA-Ames Research Center to tell the Department of SETI: Searching for Extraterrestrial Intelligence. She and her colleagues are making use of existing radio telescopes to search the frequency bands for signals from nearby stars. With new computers, they hope to be able to detect very narrow band signals in the near future.

Later in the series, our own Dr. Sam Greene presented the second part of his account of the search for evidence that the earth has been visited by extraterrestrials. As on the Asian trip he described last year, he found no convincing evidence for extraterrestrial influences among the beautiful ruins of Peru. He did present some interesting legends of the Dogon people of West Africa and suggested that these might indicate that the ancestors of the Dogon had encountered extraterrestrials.

The last three lectures this semester will all be by members of the Department: Joe Tenn, Tom Barnebey, and Isaac Bass.

Dr. Tenn will lecture on "The Discovery of the Galaxies" on Nov. 21. He will describe the historical problems of the nature of the Milky Way and the nature of the "fuzzy" objects in the sky called nebulae. The discoveries of the nineteenth and early twentieth centuries which led to an understanding of the true nature of these objects will be explained. It is little more than half a century since Edwin Hubble discovered that many of the nebulae are galaxies like our own, systems of hundreds of billions of stars rotating slowly in space.

On Nov. 28, Dr. Barnebey will present "A Pitch about Pitch". The popular teacher of Sonoma State's physics of music course will discuss recent developments in the theory of musical pitch perception. Barnebey, who is a musician as well as a physicist, will also demonstrate some pitch-related phenomena.

"Gas Lasers and Holography" will be the topic Dec. 5 when Dr. Bass describes what he and his students are doing with the College's powerful new laser system. Beams up to 5000 times as energetic as those of the common helium-neon lasers can be produced, and they can be made in a variety of colors.

Holograms, or three dimensional pictures, are made with the laser system.

Coffee will be served at 3:30 before each lecture.

The spring series will again be on Mondays, with lectures weekly from Feb. 13 through May 15, excluding Feb. 20 and March 20, when classes will not be in session. Anyone interested in speaking in the spring series should contact Dr. Tenn this fall.

Students and faculty of the Sonoma State College Department of Physics and Astronomy have presented papers at three meetings of the two principal astronomical societies in the past year and a half.

In May, 1976, the Astronomical Society of the Pacific (ASP) held its annual scientific meeting at the University of California, Berkeley. As part of this meeting, a symposium on astronomy education was held. Dr. Joe S. Tenn presented a paper, "Astronomy as a Major Part of an Innovative B.A. Program in Physics," at this symposium. Dr. Tenn and Miriam Carolin also attended many sessions of the scientific portion of the meeting. The abstract of the paper may be found in the Publications of the A.S.P., vol. 88, page 619 (Oct.-Nov. 1976).

The American Astronomical Society (AAS) held its 149th meeting at Honolulu, Hawaii, in January, 1977. Dr. Gordon G. Spear spoke on "Preliminary Appraisal of a Method for Studying the Companions of Emission-Line Stars. . . The WR Stars." Dr. Tenn gave another talk on astronomy education, "Astronomy in the Undergraduate Physics Curriculum". Abstracts appear in the Bulletin of the A.A.S., vol 8, pages 522 and 546 (1976).

Both professors spoke at the 1977 meeting of the ASP, held at Pomona College in June. Both presented research papers, and both had SSC students as coauthors. The abstracts will appear in the Oct.-Nov. issue of the Pubs. of the A.S.P. "A Qualitative Analysis of the Spectrum of FG Sge, 1972-76" was presented by Dr. Tenn and Miriam Carolin. The paper was the result of three years of analysis of data obtained with the 3-meter telescope at the Lick Observatory and analyzed at Lick during the summers by Dr. Tenn and at Sonoma State, primarily by Miriam, during the academic years.

Paul Avellar, Miriam Carolin, Jim Mills, Marguerite "Tinka" Ross, and Stephanie Snedden were coauthors with Dr. Spear of "Preliminary Results of Photometry of VV Cephei at the Beginning of the 1976-77 Eclipse." This, the first report of research performed at the College Observatory, was the result of a program of photoelectric photometry described elsewhere in this newsletter.

Miriam and Stephanie attended the ASP meeting along with the two professors. While in southern California, they also visited the headquarters of the Hale Observatories.

It is not known whether anyone from the Department will attend the 1978 ASP meeting, to be held in Utah, but there is already substantial local interest in the 1979 meeting.

It will be held at Sonoma State College.