

The Physics Major

PUBLISHED BY THE DEPARTMENT OF PHYSICS AND ASTRONOMY TO IMPROVE COMMUNICATION WITH ITS MAJORS. Oct. 1974

This newsletter is a volunteer effort, produced by Lynn Hubbard, Mike McBride, and Joe Tenn.

WHAT PHYSICISTS DO SERIES STARTS TREND

The "What Physicists Do" series, now in its eighth semester, is one of the oldest lecture series on campus. Unlike some department's colloquia, it is aimed at the public as well as the physics majors.

Now, as many other departments of the college start their own series, it may be worth recalling that the series is planned each semester with the physics major in mind.

Each Monday afternoon there is an opportunity to hear an interesting speaker or watch a good film or demonstration in some branch of physics, astronomy or a related field. Past speakers have included two Nobel prize winners as well as many other prominent scientists. Sonoma State students and faculty often participate.

If you are thinking about graduate work in meteorology, biophysics, or astronomy, or about working in industry with lasers or electronics, the series will enable you to hear someone currently active in the field. At the coffee reception before the lecture you can ask the speaker more specific questions. This is also a good time to get better acquainted with your department's faculty and students.

This is your department's weekly colloquium. You can even take it for one unit of credit, applicable to meet the elective requirement for either the B.A. or the B.S. in physics. Dr. Tenn, who is directing the series this semester, would like to hear from you. What kinds of speakers would you like to see next semester?

PHYSICS GRADUATES TEACHING

Roberto Ramirez teaches physics and mathematics at Healdsburg High School. Jim Hill does the same at Los Gatos Union High School. In a prep school in Hawaii, John Proud is teaching mathematics and astronomy.

All hold degrees in physics from Sonoma State. Jim and John also earned their teaching credentials here. Roberto did his graduate work at UCLA, where he earned a masters degree as well as his credential.

They will soon be joined by two other graduates of the department. Steve Williamson, a 1973 graduate, is a graduate student in physics at UCLA. He will soon complete a program in which he will earn both a Master of Science in Teaching degree and a teaching credential.

David Kelso, a 1974 graduate, is enrolled in the secondary credential program on campus. He is taking some more physics and astronomy in addition to his education courses. He expects to be student teaching in the spring.

ASTRONOMY PROGRAM GROWING

The astronomy program at Sonoma State has been growing steadily for the past five years. Lately the growth has accelerated. The Department of Physics and Astronomy, formerly the Physics Department, has been participating in the nationwide upswing in student interest in the universe.

The department is expanding its list of second courses, courses aimed at students who have taken one of the popular survey courses in the field and wish to learn more.

Dr. Sam Greene has been offering Cosmology and Extraterrestrial Intelligence to capacity crowds for years. He now plans to split the two subjects into two courses. A more advanced course in extraterrestrial intelligence and communication is also likely to appear.

Frontiers in Astronomy, a course in the discoveries of the 1960's and 70's, is currently being taught by Dr. Joe Tenn. Quasars, pulsars, black holes, interstellar molecules, planetary exploration, and the "new astronomies" -- infrared, ultraviolet, x-ray, neutrino, and gravitational waves are featured in this non-calculus course.

Several second courses are likely to be offered by Dr. Gordon Spear, an important addition to the Department. Dr. Spear, the first member of the department to earn his Ph.D. in astronomy rather than physics is considering offering Celestial Navigation and possibly courses on U.F.O.'s and on astroarchaeology, a field in which he is doing some research.

Dr. Spear's primary efforts are likely to be in observational astronomy. He is currently teaching the Astronomical Measurements course and intends to start an upper division laboratory course next year.

Observational work is greatly helped by the construction of a stable pier for the Celestron 10-inch Schmidt-Cassegrain telescope on a dark corner of the campus. This pier is being built with the aid of an NSF Institutional Grant obtained a year ago by Drs. Joe Tenn and George Johnston with the assistance of student Steve Alexander. It is expected to become the nucleus of a small on-campus observatory.

At present there are three theoretical courses in astronomy for the calculus-using student. The two semester course in astrophysics is offered in alternate years. Look for it next fall. This semester, Dr. George Johnston is offering Space and Planetary Physics. As he is finding that much can be covered in this field without calculus, he is likely to offer a more descriptive course soon.

MEETING SET FOR THOSE PLANNING FOR GRADUATE SCHOOL

Seniors and Juniors who are planning to attend graduate school in physics, astronomy, and related fields are invited to attend a meeting on Wednesday, Oct. 16, at 4 p.m. in Dar. 329. Several members of the faculty will be there to offer their perspectives on the problem of choosing a school and perhaps a field. The time for applying is rapidly approaching.

THE JOYS OF RESEARCH NEAR ABSOLUTE ZERO

OR AT ANY TEMPERATURE

by Dr. Isaac Bass

I will take the editorial liberty of making this a brief personal note about the evolution of my thoughts and activities since coming to Sonoma State in the fall of 1970.

The first year or so was partly devoted to professional soul searching after eight years of work devoted primarily to experimental research in atomic, solid state, and low temperature physics. What I wanted to do in addition to teaching was something of a question in my mind. I eventually arrived at answers and decisions, and like many of us here, I benefited in no small measure from Gary Sposito's ideas and influence. I concluded that basic research was an indispensable element of my professional life and decided to continue and develop upon the work in low temperature physics that I had been doing at Stanford prior to coming here. I wanted to share the pleasures and excitement of this kind of work with students at Sonoma State.

My choice of research subjects is not motivated by their social, environmental, or technological relevance although I am not oblivious to those considerations in general. Rather, the scientific questions are intriguing.

My research program can be divided into four areas. One is the study of the magnetic interactions of ^3He atoms with each other and with other atoms and molecules in the gaseous state at room temperature. Closely related to this is work on the influence of Fermi-Dirac statistics on the properties of ^3He gas, liquid, and solutions in ^4He at temperatures between 4°K and 0.3°K. My other two areas of interest are studies of the magnetic properties of materials at low temperatures and geophysical studies of remnant magnetization in rocks.

To carry out this work I have received generous support from the Department of Physics and Astronomy and a Cottrell Research Grant for \$12,750.00. The department has purchased a state of the art superconducting magnetometer to be used in the magnetic materials and rock magnetism studies. The grant money is being used for the ^3He research. A ^3He evaporation refrigerator is currently under construction and will be capable of reaching temperatures near 0.3°K.

In closing, I would like to point out that my kind of research differs markedly from most of what you see in the sciences at Sonoma State. The apparatus cannot be purchased off the shelf from vendors. We must design and build the equipment to fit the experiment, not vice versa. It is precisely this aspect of the work that appeals to me. It requires time, patience and persistence, and progress sometimes seems excruciatingly slow. But the rewards to me are great.

I feel that participation in on-going research is a unique and important experience for undergraduates. Students wishing to work with me will design, construct, and operate equipment to be used in the experiments. This usually entails consultation with me, library research, work in electronics, and collaboration with a highly skilled scientific machinist. Credit is received through special studies (Physics 495) or undergraduate research (Physics 497). If you are interested, please feel free to come in to see me.

PHYSICS GRADUATES EARN HIGHER DEGREES

A large fraction of Sonoma State's graduates in physics have gone on to earn advanced degrees in physics and in related fields.

The first to earn a Ph.D. was Ken Larsen. Ken, who earned bachelor's degrees in both math and physics at Sonoma State in 1969, received his doctorate in computer science from the University of California, Irvine in 1973.

Bob Steele, a 1970 graduate in both math and physics, stayed a year as a graduate student in mathematics. He then went to the department of physics at UC Santa Barbara, where he is doing research for his doctorate in experimental atomic physics. He received his master's degree last year.

Three 1971 graduates of the department were offered assistantships to graduate schools. While Ed Davis declined his offer because of pressures from the draft (remember?), Niles Severy and Paul Goodwin accepted offers from the University of Colorado and the University of Alaska, respectively. Both are working in geophysics and expect to complete work for their doctorates soon.

Arnold Christiansen, a 1974 graduate, has recently begun graduate study at the University of Rochester. Arnie, who received a partial fellowship, intends to earn a Ph.D. in quantum optics.

Several graduates have earned master's degrees. Steve Jilka earned an M.S. in physics at San Francisco State University in 1972 and then accepted employment with Control Data Corporation in San Diego. Basil Swaby, a 1974 graduate, is currently enrolled in the master's program at S.F. State.

David Nielsen, another 1974 graduate, is a graduate student in physics at the University of Nevada, Las Vegas, as well as a full-time physicist with the Environmental Protection Agency there.

STUDENTS WELCOME AT DEPARTMENT MEETINGS

Students are reminded that the physics and astronomy dept. meetings are open to all students as well as faculty. There are many important issues which are discussed and resolved at these meetings and student input is encouraged.

One of the topics currently under consideration by the dept. is the hiring of a new professor to replace Dr. Garrison Sposito who left last year. Dr. Sposito's vacancy is being filled temporarily this fall by Dr. Tom Barnebey. Dr. Barnebey, a musician and composer as well as a theoretical physicist, is teaching the popular Physics of Music class.

The choice of the new instructor will have considerable impact on what the department offers its students. Would you like to see an applied physicist, a geophysicist, a biophysicist or perhaps a specialist in solid state or atmospheric physics? Should the department emphasize popular, non-calculus courses?

Notices of the time and place of dept. meetings are usually circulated a couple of days in advance. So keep your eyes open for important things stuck on doors on the third floor of Darwin and plan to drop by.

$$E = mc^2$$

GRADUATE RECORD EXAM IMPORTANT

Students planning to enter graduate school in physics, astronomy, or related fields will probably need to take the Graduate Record Exam (GRE). Many graduate departments require scores on the aptitude or the advanced test in physics. Those which do not require the tests often recommend that they be taken, particularly by applicants from smaller colleges.

A high score on one of these tests can be helpful in gaining admission and financial assistance at one of the more select graduate schools. Even a low score can be helpful, in that it may direct the student to apply to a graduate program with a more open admissions policy.

One advantage of the more select schools is that they usually offer assistantships to nearly all the students admitted. Teaching assistants generally do better in their graduate work than non-assistants. They finish no later.

The GRE is a high-speed, multiple-choice, machine graded exam. It is offered several times a year by the Educational Testing Service (ETS). The aptitude test is given on a Saturday morning, the advanced tests that afternoon.

A large number of graduate departments require that all application materials be submitted by some time in February. In order for your score to be available by about Jan. 27, 1975, you will have to take the Dec. 14, 1974 exam. If the graduate departments to which you are applying have later closing dates, you may be able to take the Jan. 18, 1975 exam.

Note that in many cases you will have to apply to a department for an assistantship and to a registrar or graduate school for admission. The latter may have a late deadline, but the department is likely to hand out the dollars in February or March.

The Dec. 14 date is a bit inconvenient. It is the weekend before final exams start at Sonoma State, and the nearest place to take the GRE is 50 miles away. The exam will be given at the U. of S. F., at S.F. State Univ., and at U.C. Berkeley. THE DEADLINE FOR THE RECEIPT OF YOUR APPLICATION TO TAKE THE EXAM IS NOV. 19. Your application must reach the ETS in Berkeley by that date. The fee is \$10.50 per exam. For an extra \$4. late fee you can submit your application up to one week later.

If all of the departments to which you are applying can wait for your score until Feb. 20, 1975, you are in luck. Not only can you take the exam on Jan. 18, in the middle of the semester break, but you can take it right here on the Sonoma State campus. THE DEADLINE FOR THE RECEIPT OF YOUR APPLICATION TO TAKE THIS EXAM IS DEC. 24. Again, you can apply up to one week late for a \$4. late fee.

Applications may be obtained at the Testing Services Office in the Field House, or you can write to Educational Testing Service, Box 1502, Berkeley, CA 94701.

Dr. Joe Tenn spent three weeks at the University of California, Santa Cruz, where he worked with astronomers from the Lick Observatory. He spent one night at the observatory, where he helped take a spectrum of the star FG Sagittae with the 120-inch telescope.

GRADUATES WORKING LOCALLY

While most college graduates move around & lose contact with their alma maters, a growing number of Sonoma State physics majors have found employment in Sonoma County.

Remaining closest to "home" are the two graduates who work for the department. Both Kent Nelsen (BA, 1974) and Bob Porter (BS, 1971) hold degrees in physics from the college.

Kent, the master of the stockroom, has worked for the department since earning his first degree, in anthropology. During the next few years he began taking physics courses, one at a time, and gradually accumulated enough credits for a second bachelor's degree. He is especially interested in solar energy and has been doing some experiments on the roof of Darwin Hall.

Bob, who has extensive background in electronics, is the department's electronics technician. As this is a half-time job, it leaves him with time to pursue some of his many other interests. At various times he has taught courses in the physics of music, electronic music, and electronics. He is currently supervising a group of students doing unusual projects in physics. Actively involved in Ubiquity, the group sponsoring the Psychic Year at Sonoma State, he has even found the time to earn a master's degree in psychology.

Optical Coating Laboratories, Inc., one of the largest technical employers in the county, employs two graduates of the department, Ed Knudsen and Michael St. Laurent. Both graduated in 1973.

Eileen Phillips, a January 1974 graduate, is currently employed by National Controls in Santa Rosa. Clyde Underwood, a June grad, is working for Space Microwave Laboratories in the same city.

The non-calculus Bachelor of Arts major was not intended to produce physicists. Yet some of its graduates make use of their physics training in a variety of jobs. One such is John Morton, a reporter for the Petaluma Argus Courier. Many fine science articles have appeared in that paper written by John.

SUMMER IS RESEARCH TIME FOR FACULTY

During the past summer several members of the department of physics and astronomy worked on research. While some, such as Dr. Isaac Bass, with his low temperature laboratory in the basement of Darwin Hall, worked on campus, others traveled to other institutions.

Dr. George Johnston worked in Berkeley as a member of the theoretical physics group at the Lawrence Berkeley Laboratory. While working on problems in theoretical plasma physics, he developed several ideas for student research projects.

Plasma Physics
 (He will present two papers at the meeting of the Division of Fluid Dynamics of the American Physical Society in Albuquerque, New Mexico late this month.

Dr. John Dunning was also at the LBL. He participated in an AEC-sponsored seminar on Energy and the Environment and did further work on x-ray fluorescence, a subject that is certain to appear in his course on applied nuclear physics and chemistry this spring.

NEW FACULTY IN DEPARTMENT

ADVISING ADVISED

There are two new faces on the faculty of the dept. of physics and astronomy, Dr. Richard Karas and Dr. Gordon Spear.

Dr. Karas has been hired to fill the vacancy left by Dr. Duncan Poland who has been elected head of the natural sciences division.

Rich is teaching Physics 209A and 210A general physics and lab, Physics 311 Elements of Electronics and lab, and Physics 354 Problems in Environmental Physics.

With his free time Dr. Karas likes to get away from it all by soaring. He has had a glider pilot's license for five years and is part owner of a single seater glider, based in Calistoga.

Dr. Karas was educated at UCLA and UC Berkeley where he received a Ph.D. in Atmospheric Science. He also spent a year in Norway as a post-doctoral fellow studying auroral and atmospheric phenomena. For the past three years he has been teaching at UC Berkeley, both in the physics department and in an interdisciplinary program in which he taught history and philosophy of science.

Dr. Karas hopes that he will be able to interest students in doing original research projects here at Sonoma State. Any students who may be interested in pursuing this should stop by his office, Darwin 20K, and talk to him.

The other new man on the expanding staff of the physics and astronomy dept. is Dr. Gordon Spear.

Dr. Spear comes to Sonoma State after two and one half years with NASA. He worked in Houston studying ultra-violet stellar spectra using data obtained from spacecraft such as Gemini and more recently Skylab.

This semester Dr. Spear is teaching Astronomy 100 descriptive astronomy, Astronomy 200 introductory astronomy, Astronomy 231 astronomical measurements, and Physics 320 analytical mechanics.

Dr. Spear earned both undergraduate and graduate degrees in astronomy at the Univ. of Pennsylvania in his native Philadelphia* Outside the classroom he enjoys spending his free time sailing and pursuing his studies of interstellar communication and transportation.

Dr. Spear is seeking students who would like to work on special projects such as building a spectroscope or a cold camera. His office, carved out of the stockroom this summer, is Darwin 332A.

* The observations for his dissertation were made at an observatory in New Zealand.

The Department of Physics at Sonoma State graduated its first student in 1965. She was a transfer from another college. By 1973 the department had a total of nineteen graduates. Sixteen more graduated in 1974.

What do physicists really do late at night?

Are you aware that you have an advisor? Every student does. If you are a physics major, your advisor is currently Dr. Joe Tenn.

Your advisor would like to see you. "I would like to see every physics major at least once each semester," he states. "I have the latest information on course offerings and requirements for majors and minors. I can help you plan your program so that you earn the degree of your choice without delay."

Dr. Tenn dwells in a dungeon in the basement of Darwin Hall. Numbered 20J, it is next door to 20K which is occupied by Dr. Karas. They share phone number 795-2532.

The advisor's office is the repository for information regarding employment and graduate schools. Applications for fellowships, graduate school admission, and some jobs, mostly government, are kept in files.

Dr. Tenn is especially anxious that graduating seniors see him the semester before the semester in which they plan to graduate. He notes that "By the last semester, it may be too late to get that one course required for graduation, or to apply for an assistantship at your favorite graduate school."

As of last Thursday, Mary Condon will be taking over as Department Secretary, replacing Linda Smith, who has returned to being a full-time student.

FEEDBACK

Please tear out, fill in, and give to any physics instructor or to the department secretary in Darwin 126.

I think this newsletter is good _____ bad _____
Comments: indifferent _____

If another were published next fall, I would read it _____
not bother _____
be willing to contribute a few hours to help get it out _____
If Yes, please sign your name _____

I would like to see the department offer more courses in:

I would like to see the following topics covered in the What Physicists Do series: