The SLAC News

Stanford Linear Accelerator Center

VOLUME 2, NO. 3 JUNE 2, 1971

SLAC'S Summer YOP Programs

by Larry Esquibel

Groups of Chicano, Black, Oriental and White young people have been converging at SLAC for the past few weeks. They've been coming from East Palo Alto, Portola Valley, Redwood City and Mountain View. They are students from San Francisco State, Nairobi, Stanford, local junior colleges, and it is also known that some are still in high school.

Demonstrators? Leftist young radicals? Agitators? Not at all. These are for the most part serious young people who have heard that SLAC has summer employment and they're here to ask about our program. Here's what we've been telling them.

This summer SLAC has approximately 75 slots for the Youth Opportunity Program, the majority of which have already been filled. The same criteria for eligibility that applied last year will apply this year. "Youth" means that they must be between 16 and 21 (inclusive) and "Opportunity" translates into affirmative action to help out disadvantaged young people and their families. The third element for eligibility is that they be useful to SLAC and each application is carefully reviewed with these items in mind.

Of the 75 YOP slots, 15 are designated as Summer Science Project slots and these are allotted to youths who have an academic interest in science. Dr. Sid Drell has been spear-heading this Project and last year's effort was our pilot program. This year we hope to improve those things that were lacking last year and to probe new possibilities. As a part of the YOP, the Summer Science Project shares the same goals. But there is an added mission viz. to encourage members of minority groups to pursue careers in science. Except for the Oriental minority group, minority Americans are noticeably lacking in the science field. A few minority students have begun to break into the field and SLAC is trying to provide as much encouragement as possible. Dr. Ernest Coleman, himself a Black physicist, will be at SLAC to do research and to coordinate the Summer Science Project. Dr. Coleman is presently teaching physics at the University of Minnesota.

Other job openings for the SEP represent nearly the whole gamut of what

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County Bookmobile at SLAC

"Pornographic!"
"Obscene."
"Perverted."
"Sex-ridden."
"Designed to corrupt the morals of our youth and weaken their respect for the Free Enterprise system."

None of these comments were used to describe the books available to interested SLAC employees through the newly-instituted regular visits to SLAC by a bookmobile from the San Mateo County Library System.

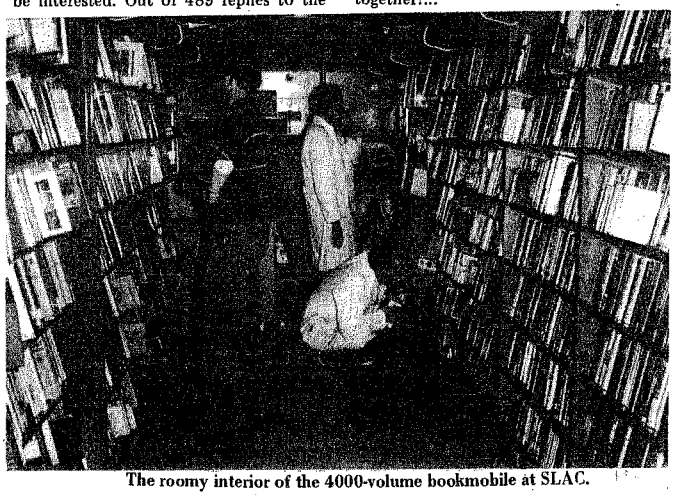
The first visit occurred on May 17 and we can expect the 4000-volume bookmobile to return every other Monday beginning June 14 and stay on-site from 12:00 to 1:00 p.m. The bookmobile will be situated near the Test Lab volleyball court.

The visits came about as the result of a survey conducted in March by SLAC Librarian Bob Gex to see if people would be interested. Out of 489 replies to the survey he initiated, 285 expressed interest, so the idea of mid-day visits by a bookmobile was instituted.

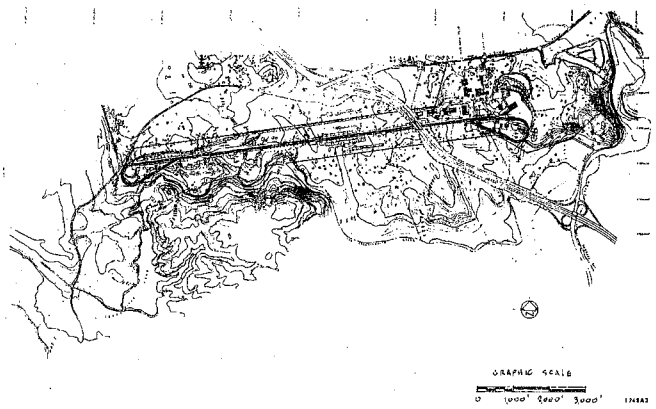
The San Mateo County Library System operates two bookmobiles with a total stock of 24,000 volumes. The 4000 volume bookmobile visiting SLAC is the larger of the two. Between them over 100,000 books will be circulated this year. The bookmobile service, instituted in 1953, serves the entire county and the two bookmobiles log 14,000 miles per year, according to Mrs. Evelyn Helmer, Public Information representative of the County Library System.

If you're worried about whether a particular book you're interested in is available, it should be pointed out that the entire 500,000 volume stock of the County Library System is at your disposal through inter-library loan.

Information on library cards is available from Bob Gex, SLAC librarian, extension 2411. Come, let us browse together!...



The roomy interior of the 4000-volume bookmobile at SLAC.



Supersloop layout superimposed on the SLAC site.

'Supersloop' Proposed to AEC

How can SLAC most economically increase the energy of its electron beam?

One method is to upgrade the existing accelerator by, for example, increasing the output power and/or the number of klystron tubes which accelerate the beam. Another technique involves the conceptually simple idea of sending a previously accelerated pulse down through the accelerator again.

The latter technique is embodied in a proposal submitted by SLAC in April to the Atomic Energy Commission for possible implementation in fiscal year 1973, and is popularly called "Supersloop." It is anticipated that a beam energy of up to 60 billion electron volts (GeV) will be obtained by using the Supersloop idea in conjunction with klystron improvement ideas.

Before dealing with Supersloop itself, let's review some current and proposed accelerator improvements.

Initially, SLAC's design was for a beam energy of 20 GeV attained with klystrons whose peak output power was to be 20 million watts (20 MW). 30 MW klystrons are now available and are replacing the 20 MW tubes when they fail. With this program (called "SLAC Prime"), a 25 GeV beam should be attained within the next 2½ years.

Over and above this, it may prove possible to place a 60 MW klystron at each station in the Klystron Gallery. This would increase the beam energy up to 35 GeV, and is called Stage 1½. A reduction in the number of pulses of electrons per second accelerated from the present 360 to 180 would be necessary to permit operation at 35 GeV without greatly expanding the electrical and cooling water facilities.

Supersloop would be able to take the beam energy of any of these options and roughly double it. Here's how it would work, assuming we're at stage 1½.

Electrons will be injected into the existing accelerator, and accelerated to 25 GeV (maximum). A magnet ring passing through End Station B will turn the beam with a 300-foot radius back into a drift tube located within the existing accelerator housing and parallel to the accelerator. Another set of magnets at the injector end will turn the beam around again and send it back through a second drift tube. After about 112 revolutions through this 26,400 foot storage path, the pulse will again be sent through the accelerator, picking up 35 BeV (maximum) for a total of 60 GeV.

Why is the long storage period necessary? If the accelerator is operating at a repetition rate of 360 pulses per second, the "dead time" between pulses is 1/360 second, or 2.8 milliseconds (milli=thousandths). The time for a complete transit through the 26,400 foot system is 25 microseconds (micro=millionths). To find the number of stored transits required, just divide 2.8 milliseconds by 25 microseconds. The answer is 112!

A few questions arise at this point. If we're able to accelerate electrons to 35 GeV each time through the accelerator, why is the first "pass" only at 25 GeV? Also, why stop with two passes? Why not run the beam through, say, 100 accelerations (which would take less than a second), which would give SLAC 3,500 GeV electrons?

The answer is that the electrons, in the course of having their directions changed by magnets, lose energy. They "radiate" electromagnetic energy in the form of what is called "synchrotron radiation." The energy lost through synchrotron radiation increases with the beam's energy (as the fourth power of the energy). A 25 GeV electron making one revolution through the Supersloop storage system would lose 0.52 GeV, which can be resupplied relatively easily (as we shall see), but a 35 GeV electron would lose over

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Slacontests Extended

The famous "Give the Newspaper a Better Name" and "Design a SLAC Emblem to Use on the Newspaper Masthead" contests' deadline has been extended to June 11, mainly because the contest judges haven't yet been able to get together. So, if you would like to enter, just send your submission to Steve Kociol, Bin 10. Each contest has a $20 prize, you will recall.

Preprints/Anti-Preprints:

SLAC Library Monitors Underground Physics Press

by Louise Addis

Preprints are the underground press of the particle-physics world. For the past three years, the SLAC Library's weekly newsletter "Preprints in Particles and Fields (PPF)" has been providing that world with a popular and reliable master key to its preprint press rooms.

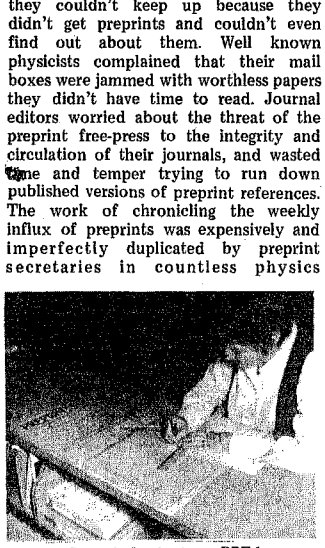
But what are these slightly clandestine preprints? What indeed are anti-preprints? Why is a PPF needed to keep track of them all?

Preprints look innocent enough, a modest sheaf of mimeographed, dittoed, or multilithed sheets locked together by a staple or two. Despite titillating underground-sounding titles about "Degenerate Daughters," "Ghosts and Gotterdaemmerungen," Two- and Three-Body Problems," reading reveals uniformly benign texts unintelligible to anyone but particle physicists. A few sport fancy covers (like the Lemonade and Orangeade series from Cal Tech) but most are as plain as the hundreds of other documents in the bulging boxes and bags of mail delivered daily to the SLAC Library. But to Rita Taylor, SLAC Preprint Librarian, 50 to 100 items in each week's heap are special. Using, one suspects, ESP or other exotic devices, Rita quickly sorts them from the piles of other material, checks to see that they are not repeats, then launches them on the way to announcement in the next PPF.

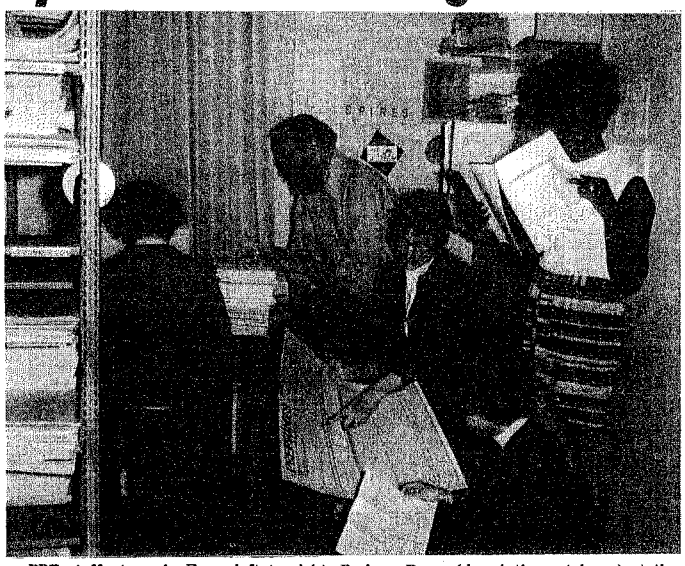
These are the preprints. They report the latest experimental and theoretical brain flashes in particle physics, and are being pre-circulated by their authors at the same time that a manuscript is being submitted for more formal but dilatory publication in a journal. If after months or even years, such a paper finally achieves immortality in the pages of a journal or book, it will be transformed into an "ANTI-PREPRINT", proclaimed in a special green section of PPF, and the original preprint discarded. (A reprint or offprint, by the way, is the exact opposite of a preprint, since it is a copy of an article after it has been published.)

Like many other products of underground presses, preprints are not for sale, but are obtained by being on mailing lists, by knowing somebody else who is, by having a library that makes a real effort to collect them, or by finding out about a particular item in time to write the author for a copy.

Until recently most libraries scorned preprints and most preprint authors made up mailing lists that included people they knew and famous physicists in large laboratories. Less known physicists in out to the way places complained bitterly they couldn't keep up because they didn't get preprints and couldn't even find out about them. Well known physicists complained that their mail boxes were jammed with worthless papers they didn't have time to read. Journal editors worried about the threat of the preprint free-press to the integrity and circulation of their journals, and wasted time and temper trying to run down published versions of preprint references. The work of chronicling the weekly influx of preprints was expensively and imperfectly duplicated by preprint secretaries in countless physics departments. Everyone cried out against the burgeoning circulation of "junk." Preprints, though obviously a vital communication link among physicists, seemed by their very nature defective in the role.



Ruth Consolo beginning a PPF layout.



PPF staff at work. From left to right, Barbara Rupp (descriptive cataloger) at the Library's computer terminal to the IBM 360/91, Bob Gex, Louise Addis, and Rita Taylor. Standing is Bennie Hicks. Not shown is Rita Glover, who normally operates the terminal. The crew is looking at the beginning of a PPF printer's pasteup.

This perplexing preprint paradox (the preprint perplex) was discussed a lot during the 1960's and some elaborate proposals made. Several preprints dealt at length with the question of how to deal with preprints, and a somewhat acrimonious debate developed about the merits of trying to centralize preprint distribution, a proposal which many thought would lead straight to preprints of preprints, to proliferation rather than containment of "junk." Nothing, however, was actually done.

Finally, in 1968, SLAC's Director W. K. H. Panofsky and LRL's Art Rosenfeld were elected Chairman and Secretary of the new Division of Particles and Fields (DPF) of the American Physical Society. Under their leadership DPF formed an alliance with three SLAC Librarians, Louise Addis, Bob Gex, and Rita Taylor, to do something about preprint communication for the whole particle physics community.

The SLAC Library, since its foundation in 1962 on a stack of dusty preprints and some coaching from a CERN Librarian, had been aggressively collecting new preprints and publishing a popular and authoritative weekly list of them for SLAC physicists. As years passed, more and more SLAC alumni requested that the SLAC Preprint List be mailed to them at their new institutions. In seemed evident that the simplest, cheapest, and most practical palliative for the preprint perplex was to publish such a list in condensed format, rush it by air to anyone who wanted it, and let him/her or a library acquire the few preprints which were of real interest. Experience had shown that even at SLAC which shelters large numbers of particle physicists, 50-60% of the current crop of preprints are never requested by anyone and that most preprints requested are of interest to just two or three specialists. (At the other extreme, a few important preprints may be of interest to almost everyone.) All preprints must be announced, of course, to enable selection to take place.

The problems of finding preprints later, referencing them after publication, clearing space on desks or library shelves could be solved by including a section called "ANTI-PREPRINTS" listing published preprints with journal, volume, and page references. The SLAC Preprint Librarian had been doing this for years for SLAC and for a few other friendly preprint Librarians.

A lightning-fast preprint announcement list coupled with anti-preprint information would complement rather than compete with other physics publications and would not upset the delicate ecology of preprints by slowing them down or overstimulating the distribution of junk. The idea was consistent with a philosophy of preprints as ephemeral documents, rough but speedy.

Master copy for the lists could be produced quickly, easily and elegantly by computer. Since the SLAC Library and its preprints were already participants in a large computerized experimental information system, SPIRES (Stanford Physics Information Retrieval System), very little extra programming would be required.

A proposal was written. In those more affluent days, SLAC soon obtained a special seed-money grant from the AEC to finance printing and mailing such a preprint list to the physicists of the DPF for an 18-month trial period. Computerization was undertaken by Prof. E. Parker's SPIRES group with financing from the National Science Foundation. PPF was on its way.

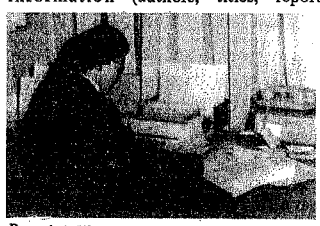
Since the whole point of preprints is speed, everything about PPF was designed to promote it: speed in production, speed in distribution, and speed in use. A printer was found who could handle the job from repro-ready copy to mailbox within 24 hours. All time-consuming refinements such as elaborate subject classifications, indexes, etc. were rejected. Not quick and dirty, but quick, clean, simple and complete is the motto for PPF!

The first issue of PPF hit the mails in January 1969, and in April all subscribers were queried to see whether the experiment was worth continuing.

The response was overwhelming. More than a thousand subscribers positively wanted to continue getting PPF and hundreds took time to write sometimes lengthy comments and suggestions. Though the PPF staff may have tended to dwell unduly on remarks like "Best thing to happen in physics information in 50 years!" "I have already found one reference which was worth the year's subscription" "Most valuable publication I get" "PPF is a necessity" "I read it religiously!" and "It's a stroke of genius", clearly PPF met a real need and its future was assured. Several laboratories, including the giant Brookhaven National Laboratory, had ceased publishing their own preprint lists and were relying on PPF. One physics department reported reproducing 50-60 copies each week for distribution to faculty and graduate students. Several overseas laboratories made arrangements to reproduce PPF for secondary distribution in their own countries. Even journal editors were enthusiastic about the ANTI-print list on practical as well as philosophical grounds. They were using it to exterminate references to old preprints in papers submitted to them for publication.

In July 1970 when the seed-money for printing and mailing ran out, PPF easily became self-supporting. Currently a year's subscription to PPF costs $10/year in the U.S., Canada, and Mexico, $18.50 overseas. It has 531 domestic and 104 overseas subscribers (not counting SLAC), is not copyrighted and is extensively reproduced at its various destinations for further distribution. PPF lists an average of 67 new preprints each week and 100 ANTI-preprints every other week. Each quarter there's a special feature called "PPF Conference Previews and Reviews" which announces future particle physics conferences and explains how to get the proceedings of past conferences. As space permits, various physics events are publicized. DPF notices appear as needed. Subscribers also receive the "Preprint Source Address List" which makes it easier to write to authors for preprint copies. (The third edition dated December 1970 listed 510 addresses.), and they may request copies of quarterly cumulations of the ANTI-PREPRINT lists.

All preprints received up to late Wednesday afternoon (and sometimes early Thursday morning) are announced on the week's PPF. (Recently an author phoned to wonder when PPF would get around to listing his preprint which he had sent three weeks ago. It turned out to have been listed the same week he sent it, but it hadn't occurred to him that such was possible.) Coded bibliographic information (authors, titles, report numbers, language, date, number of pages, source) is typed directly into a computer from a time-sharing terminal. The computer sorts, reformats the information and produces upper-lower case repro-ready copy at the same terminal. On Thursday, the copy is proofed, corrections typed into the computer and final master copy listed for paste-up. The printer picks up the result at 2:00 p.m. PPF goes into the next day's mail and arrives early Monday or Tuesday on physicists' desks all over the world.



Preprint librarian Rita Taylor creating an Anti-Preprint list.

The Anti-Preprint list is produced in a similar way after the tables of contents of all new physics journals have been compared with the current preprint collection and published articles matched with corresponding preprints. This is a tricky process since titles change from

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SLAC's Medical Department

People generally realize that a plant medical office gives pre-employment physicals and first aid in case of injury. But to think that SLAC's Medical Department does only that would be a mistake. The Medical Department provides a wide variety of services — the purpose of this article is to point them out.

The Medical Department is operated by the Palo Alto Medical Clinic, under contract to SLAC, and services have been provided since late 1966. A physician is available each morning. This job is being shared by Drs. Robert Armbruster and Leonard Sagan. A registered nurse, Joan Gardner, is on duty all day. Secretarial duties are shared by Shirley Lamborn (mornings) and Evelyn Barnes (afternoons).

The first encounter a SLAC employee has with the Medical Department is undoubtedly his preemployment physical, and he finds it to be a thorough one! Dr. Armbruster notes that this is an important way to assess an individual's base health line. Followup physicals are carried out every two years for those under 40, while the over-40 crowd has a physical each year.

Why should a group with above-average intelligence, income, and medical service availability need medical watchdogging by SLAC? A graphic answer to that is evidenced by the mass examinations in 1967 following the "founding" of the department. Undiagnosed conditions found among the 1000 SLACers then on board included cancer (0.3%), glaucoma (2%), precancerous lesions (3.8%), previously undetected diabetes (5%), high blood pressure (6.5%), elevated cholesterol levels (6.5%), and others. All of these conditions required followup, and 80% improved under referred care.

In addition to preemployment and periodic maintenance examinations, other services go into the Medical Department's Preventive Health Maintenance Program at SLAC. Treatment of work-related injuries is provided, and roughly 85% of such cases are treated here, the other 15% requiring referral to specialists.

The medical staff treats minor nonindustrial medical problems in order to keep people on the job. A simple example of this is the dispensing of aspirin. Dr. Armbruster recommends that all employees feeling ill during the working day check in with the Medical Department promptly — that "upset stomach" may be something else! Also, he would like to see people returning to work after a serious or extended illness in order to make sure they're up to it.

A final function is that of counselling and education. Members of the staff can learn about problems you might be having and then refer you appropriately. Suppose your spouse's social drinking seems to indicate a potential alcoholic condition, or perhaps the problem is related to drugs. The Medical Department staff can direct you to help.

Two of the most prevalent conditions affecting Americans which can lead to serious medical complications are smoking and obesity. To deal with these, the Medical Department has formed two clubs, open to all. The "I Quit Club" is for people interested in quitting the smoking habit. There have been about 200 "graduates" who have stopped smoking. When it is considered that smoking can lower life expectancy by 6 — 9 years, some 1200 to 1800 man years have been saved so far.

For those who shudder whenever they step on the scale, SLAC has the "Fat Farm Club." Each participant is told what constitutes his ideal weight and he "weighs in" at the Medical Department each Monday afternoon to have his weight charted. Appropriate advice is given on how to reach the desired weight. Roughly 80 people have been involved in this program.

One bit of advice Dr. Armbruster would like to share with SLACers involves participation in one of the available basic medical plans (Blue Cross, Kaiser, or United Medical Clinics/Blue Cross). He notes that a shockingly high percentage of eligible employees do not participate in any of these plans, even though SLAC pays the entire employee cost for the least expensive plan. He strongly encourages all eligible employees to join one of the plans.

Preprints

Continued from Page 2

preprint to article, and sometimes a shortened version of a paper is published in a fast acting "letters" journal while the longer preprinted version awaits full publication in the slower "Physical Review." It's important not to throw away the extensive data in the longer version until it is truly published.

PPF has been managed, edited, and cherished for the three years of its existence by the same team of SLAC Librarians, Louise Addis, Bob Gex, and Rita Taylor, with the indispensible help of Ruth Consolo, lay-out, Rita Glover, computer input, and Barbara Rupp, descriptive cataloging. Bennie Hicks compiles the quarterly section "PPF Conference Previews and Reviews" from her own more complete SLAC publication "Conference Previews."

AT SLAC, physicists not only receive a weekly copy of PPF automatically (until recently a special expanded version was published for home consumption), but they have immediate access to all the preprints listed on it. The weeks' preprints are displayed in the Library reading room Monday through Friday where readers may sign up for them or make their own xerox copies. Cards are also filled in the SLAC Library catalog for all the authors of each preprint, so if the recollected author is the twenty-third and his name begins with Z, the preprint can still be located. Subject searching of the preprint collection is available through an on-line information retrieval system, SPIRES. A future SLAC NEWS article will describe SPIRES and how it may be used for personally tailored literature searches of the underground press of particle physics.

Letter to the Editor

(Editor's Note: Since March, SLAC has placed a 3-inch ad in the "Stanford Daily" thrice weekly concerning the availability of guided tours. The following letter, addressed to the "Public Relations Bureaucracy" and signed by "A Commune Member," was received recently.)

To: The Public Information Bureaucracy

This advertisement is yet another example of rampant establishment bourgeois chauvinism. It is transparently clear that a "guided" tour of the people's accelerator will permit the people to see only what the decadent capitalist bureaucratic Director wants them to see. Only when tours are abolished will it be possible for the peace-loving students to see what the actual truth is about SLAC. Abolish all restrictions, abolish tours, abolish gates, abolish controls. Remove the restrictive, repressive, denigrating requirement that a member of the people must get a "radiation badge" (pseudonym for a control mechanism) in order to actually see the people's accelerator. Abolish the gates. Let the people enter, via the Alpine Road entrance, with no "watchman" set to take pictures of the truth-seeking entrants. Turn off the flashing lights which are well known by all progressive elements to be designed only to keep the people from the truth. Permit the students to observe what actually goes on at night when the decadent physicists are known to do their sneaking, conniving experiments to control the masses and to guide the divergent elements into their own corrupt way. FREE THE PEOPLE'S ACCELERATOR!

A Commune Member

MPC's in place within the shielding at the rear of the 20 GeV spectrometer. The view looks upstream; MPC number four is closest.

MPC--Improves Spectrometer Performance

by Charles Oxley

A new device, the Charpak or multi-wire proportional chamber (MPC), has been installed at the rear of the 20GeV spectrometer in End Station A. An array of five MPC's has replaced the scintillation counter hodoscope in two recently completed experiments. In one experiment, members of Group A studied the inelastic structure region of electron-proton scattering, the energy region in which very short-lived "resonance" particles tend to be produced. Improved results, made possible by combined use of MPC's and new data processing, will allow examination of the data for evidence of new particles or resonances.

Multi-wire proportional chambers originated at the European Center for Nuclear Research (CERN) through the work of Charpak and his group. Based on the simple proportional counter idea of Geiger and Klemperer, they have reached a high degree of sophistication and applicability. The inelastic structure experiment has been their first use at SLAC.

The single-wire proportional counter acts by magnifying the original ion trail left by the passage of a charged particle through a gas. Multiplication of the number of ions occurs through a cascading of electrons in the strong electric field produced near a fine wire when large voltages are applied to the chamber. Proportional counters or chambers operate in a voltate regime which is between the non-multiplying ion chamber on the one hand and the Geiger counter — spark chamber regime on the other.

Proportional counters, even though they amplify the "signal" of an incident electron by more than a million, reflect the ionizing power of the originating particle in their pulse output. However, Geiger and spark chambers lose that information; a single ion pair will result in practically the same output as that initiated by many ion pairs.

The discovery of Charpak was that a grid of finely placed wires each independently charged and sensed could act as a series of independent proportional counters. By trying various gas mixtures, pressures and other operating conditions, workers have succeeded in making a very efficient, electrically fast system which specifies the position of a particle to within two millimeters or better. From the start, with relatively few wires and simple uses, the techniques have progressed to the imminent use of 10,000-wire MPC systems.

Among the MPC's coming into use in many laboratories, the SLAC chambers developed by Group A are of an intermediate degree of complexity. They are designed specifically for spectrometer upgrading.

There are five chambers; each one consists of about 100, 20-thousandths of an inch diameter gold-plated tungsten wires. Placed two millimeters apart, eicht-inch long wires make a parallel grid eight inches across. The wires of the sensing array are placed between two high voltage planes of fine aluminum mesh and in turn these are supported by a frame. Mylar windows cover the frame and contain the gas — a mixture of 80% argon and 20% isobutane. Some electrons scattered from a hydrogen target enter the spectrometer and exit to the array of counters.

The five counters, three with their wires horizontal and two with vertical wires, make possible the reconstruction of the path of an electron leaving the spectrometer. The previously-used scintillation counters were all placed at the focal plane of the spectrometer — they indicated position only. The additional directional information from the MPC's allows rejection of electrons scattered from the magnet pole tips and from other unwanted sources. Also, the resolution of the spectrometer system was improved by 30% with the use of MPC's.

The future applications of MPC's depend very much on the low cost and capability of the associated analysis electronics. A modest development in that direction has been made at SLAC. After initial amplification by 800 times, individual wire signals are sent on 400 cables to the Counting House. There an application of a Camac system designed by the Experimental Facilities Group at SLAC was made. Camac is based on a modular concept, originally developed at CERN, and widely applicable to experimental data processing.

The MPC system as used in the spectrometer has the following main advantages:

1. Very uniform response from element-to-element of the detecting system,
2. Improved spectrometer angle and momentum resolution,
3. Little material in the beam (this eliminates confusing multiple signals from knock-on electrons), and
4. Elimination of spurious electrons by spatial reconstruction. Pulse height information for distinguishing particle charge or speed was not used. As compared to scintillation counters, proportional counters have the disadvantage of a time-extended pulse. Nevertheless, the fifty percent longer time signal required by the MPC's is more than compensated for by the four-pulse storage system and the background rejection from track reconstruction.

SLAC personnel who made this achievement possible are Elliott Bloom, Gary Johnson, Bob Siemann, and most of the rest of Group A. In addition, Charles Prescott of U.C. Santa Cruz made valuabe contributions.

SLACROSTIC II

	1 A	2 B		3 V	4 N	5 W	6 D	7 G	8 F	9 C					
10 T		11 E	12 A		13 O	14 F	15 R		16 E	17 V					
18 Q		19 M	20 C	21 U	22 G	23 R	24 L	25 B	26 O						
27 S	28 R	29 I	30 T	31 L	32 Q	33 J	34 P		35 J	36 W					
37 A	38 O		39 W	40 C	41 N	42 L	43 B	44 O	45 D	46 G					
47 J	48 T		49 S	50 D	51 V	52 U	53 P	54 H	55 A						
56 V	57 U	58 O	59 A		60 C	61 X	62 S	63 G	64 A						
65 S	66 E	67 V	68 O	69 N	70 H	71 P	72 R	73 H	74 M	75 J					
76 Q		77 F	78 K	79 T	80 A		81 B	82 O	83 P	84 M					
85 K	86 R	87 I		88 V	89 H	90 W	91 R	92 I	93 U	94 X					
	95 F	96 A	97 M	98 N	99 C		100 G	101 S	102 A						
103 K	104 O	105 N	106 V	107 G	108 X	109 D	110 J		111 A	112 N					
113 B	114 Q		115 F	116 P	117 K		118 R	119 G	120 F	121 N					
122 B	123 C	124 L	125 J	126 Q		127 G	128 I	129 O	130 E						

SLACROSTIC II
by E. H. Austin

1. Transfer letters from answers to corresponding squares in diagram. Blank squares separate words.

2. When complete, diagram will contain a quotation.

3. The first letters of the answers (read down) will form the author's name (7) and the book title (4, 6, 7). Note that the first letters of J and P are given.

A ___ ___ ___ ___ ___ ___ ___ ___ ___ Nobel winner who worked with Mark III in 1951. (shorted fat?)
111 96 55 12 80 1 59 102 64 37

B ___ ___ ___ ___ ___ ___ ___ Occurences at a bubble chamber.
43 113 25 81 122 2

C ___ ___ ___ ___ ___ ___ Fluid.
9 20 60 40 123 99

D ___ ___ ___ ___ (See H).
109 50 45 6

E ___ ___ ___ ___ Charts.
16 11 66 130

F ___ ___ ___ ___ ___ ___ Fasten.
120 77 8 115 95 14

G ___ ___ ___ ___ ___ ___ ___ ___ Particle having zero rest mass. (tour nine?)
100 22 127 63 119 107 7 46

H ___ ___ ___ ___ (with D) A period of time relating to radioactive decay. (2 wds.)
89 73 54 70

I ___ ___ ___ ___ Optical aperture.
29 87 92 128

J G ___ ___ ___ ___ ___ ___ A long narrow room.
125 75 35 33 47 110

K ___ ___ ___ ___ ---ron: a class of heavy unstable particles.
78 117 103 85

L ___ ___ ___ ___ Dissolve unwanted portion of a layer.
24 31 124 42

M ___ ___ ___ ___ A minimum or zero value of current.
19 97 74 84

N ___ ___ ___ ___ ___ ___ ___ ------- scattering. (slac tie?)
4 98 112 105 41 69 121

O ___ ___ ___ ___ ___ ___ ___ ___ ___ A copy on a smaller scale. (id counter?)
44 129 38 82 68 13 58 104 26

P G ___ ___ ___ ___ ___ (see W).
53 116 71 83 34

Q ___ ___ ___ ___ ___ Submit; relent.
76 32 114 126 18

R ___ ___ ___ ___ ___ ___ ___ Temporary cord circuits.
118 86 23 72 28 15 91

S ___ ___ ___ ___ ___ Lift.
49 101 62 65 27

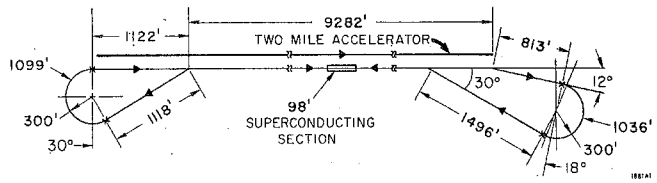
T ___ ___ ___ ___ Court; field.
10 79 30 48

U ___ ___ ___ ___ Examine for features of interest, such as for B above.
52 93 57 21

V ___ ___ ___ ___ ___ ___ ___ Exert pressure upon.
17 51 88 3 67 56 106

W ___ ___ ___ ___ (with P) A cold branch of physics.
5 39 90 36

X ___ ___ ___ ___ ---nuclear particles: fundamental particles.
94 61 108



Schematic of Supersloop.

Supersloop Proposal

Continued from Page 1

2 GeV. (This effect explains why SLAC was built on a straight line.)

The energy lost by synchrotron radiation will be restored to the beam by a 98-foot superconducting accelerator section located along the drift tubes. The electrons will be given up to 3.3 million electron volts (MeV) per foot in both directions through the superconducting section. Thus, one of the "fringe benefits" of this recirculating beam method will be the opportunity to make actual use of the superconducting accelerator techniques developed here and at the High Energy Physics Laboratory on campus.

In addition to its ability to increase beam energy, Supersloop can deliver to the experimentalists a 25 GeV beam with 100 times the duty cycle of the present beam. Duty cycle is the fraction of the time beam can be delivered. Now the duty cycle is only .06% (divide the 1.6 microsecond pulse length by the 2.8 millisecond interpulse dead time). Using Supersloop it should be possible to "peel off" stored electrons from a recirculating pulse once per revolution. Thus, the duty cycle would be about 6% (divide 1.6 microseconds by 25 milliseconds).

The increase in energy and duty cycle associated with Supersloop will benefit SLAC's experimental program in a number of ways. The higher-energy beam means SLAC will have, in effect, a more sensitive subnuclear probe with which to continue experimental investigations into the inner structure of nucleons (neutrons and protons).

The inelastic electron scattering experiments, which have pointed to the possibility of a composite structure for nucleons, will be enlarged in the important parameter of momentum transfer. The increased duty cycle will allow coincidence techniques to be employed in "electroproduction" experiments, in which subnuclear particles produced by the electron beam in the course of inelastic scattering can be identified and classified.

The availability of higher energy beams of secondary particles (pi mesons, K-mesons, photons, etc.) provides a second justification of Supersloop. (SLAC is already better at producing "uncontaminated" muon, anti-neutron, and neutral K-meson beams than are proton accelerators.)

If approved, the project will be completed during the fourth quarter of fiscal year 1975 at an estimated cost of $15.8 million.

For completeness, we just mention that the name given to the possible conversion of SLAC to a 100 GeV superconducting accelerator is "SuperSLAC."

Summer Day Care

With the kids out of school for the summer, do you need supervised day care for your 5 to 8-year old? If so, take advantage of the Children's Center of the Stanford Community's second summer day care program.

The program, which runs from June 14 — September 3, will be held on the grounds of the Stanford University Children's Hospital and features four full-time staff members. Both full and part-time care will be available.

The cost of the program is very reasonable. For full-time care, the charge is $75 for four weeks, from 8 a.m. to 5:30 p.m. Part-time care costs $50 for four weeks. Substantial discounts are available for second and third children from the same family.

For more information, call Mary Clare Jacobson, 491-4380.

YOP Programs

Contined from Page 1

there is to do at SLAC. Some of the participants will type, haul, construct, account, draft, machine, sweep, compute and maybe even enjoy working at SLAC. Supervisors are currently interviewing applicants and it is expected that right choices will be made so that summer employment will be as constructive as possible both to the supervisor as well as the young people. In the Fall issue of SLAC News we'll relate the Summer Employment Program experience to you.

New Job for Dickens

Charles R. Dickens has been named director of the Stanford Computation Center, according to an announcement by Provost William F. Miller.

Dickens has been acting director of the center since September, as well as director of the SLAC computer facilities. He will continue to hold both posts for the present.

The appointment was made upon the recommendation of a special search committee headed by Prof. Edward J. McClusky of the Electrical Engineering and Computer Science Departments.

FIRST AID CLASSES

Chief Lund handing out certificates showing completion of the Red Cross Standard First Aid Course. From left to right are Oliver Eastman (EFD), David Nelson (EFD), Robert W. Johnson (EFD), Larry Henderson (EFD), Instructors Bob Narvaez and Bob Carmona, Chief Lund, and Jim Pryor (EFD). Twenty other recent graduates are not pictured.

Employees interested in first aid courses are encouraged to have their supervisors call Chief Lund for scheduling.