SLAC BEAM LINE

Nature will deliberately reveal itself . . . if only we look.
— Thomas Alva Edison

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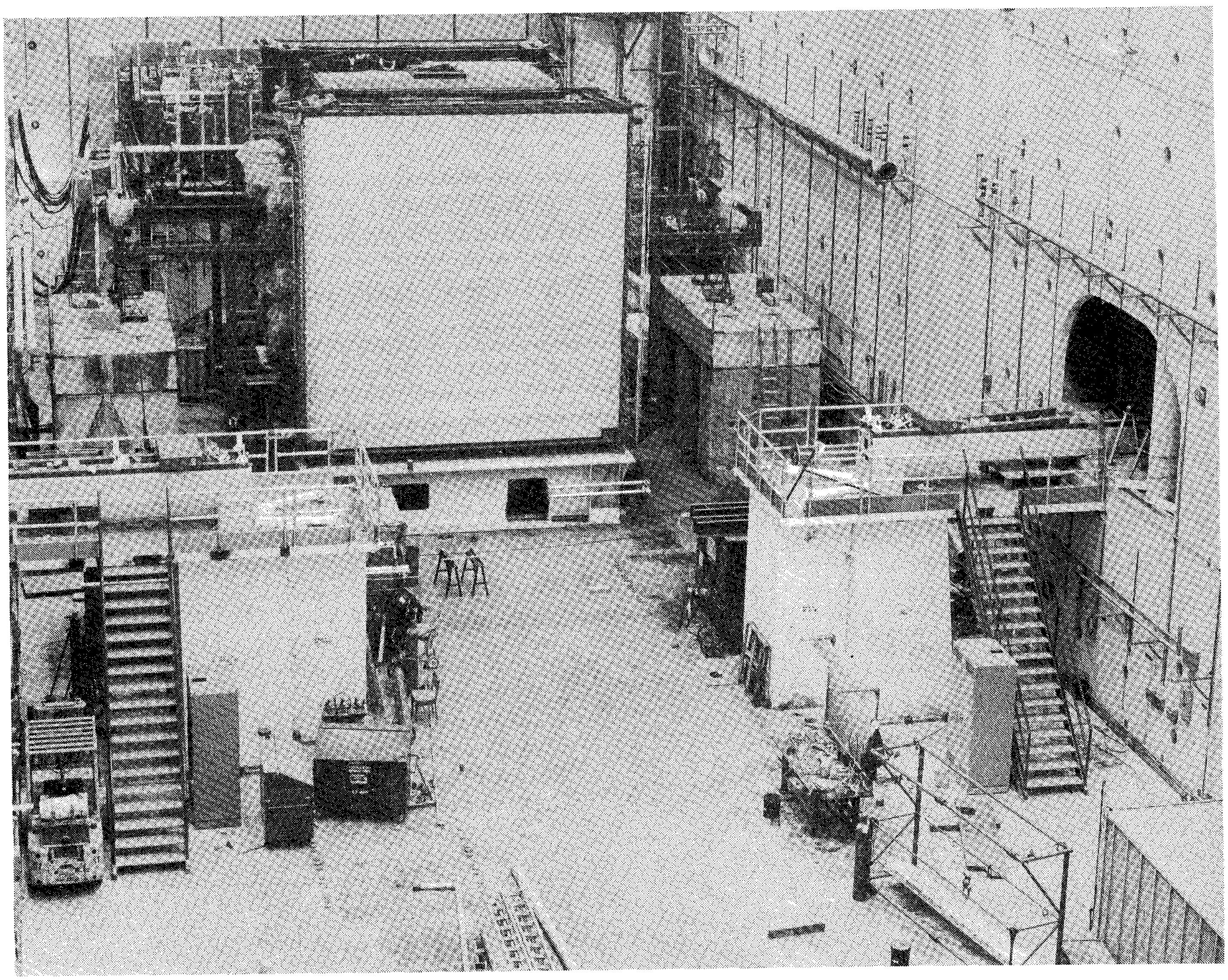

Mark II at the Collider Experimental Hall

REMARKS. . .

This issue gives a brief update on the *Mark II* detector and the SLC Project. There is also an explanation of the *SLD* detector, which has been designed specifically for the new machine. There are articles on awards & patents as well as recent retirees from Electronics, the Purchasing Department, the Accelerator Department, and the Klystron Gallery. The *SLAC* Summer Institute receives honorable mention.

If your colleagues are retiring, or you're involved in something interesting about the lab — remember the *Beam Line* is the way to let other people know! For future issues we hope to feature specific areas or projects around the lab and the people that make things happen. This requires input from the people doing the work of the lab. Forward articles and suggestions by interdepartmental mail to Bin 11 or by electronic mail to *NINA*.

–Nina Adelman

COVER PHOTO — MARK II

The cover photograph shows the *Mark II* detector now located in the Collider Experimental Hall *(CEH)*. The muon wall is easily identified in the center. At this time all major components are located at the *CEH* and final hookup is being done for cosmic ray testing. The current goal of the collaboration is to have all systems ready for a first look at cosmic rays by late 1986. This gives *Mark II* sufficient time for a thorough checkout prior to a Spring 1987 *SLC* run.

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SLC STATUS

The following questions were provided by Gordon Fraser of the CERN Courier. Don Getz supplied the answers below. – Ed.

1. *Any positrons yet?* We actually made positrons a few months ago. Soon thereafter Murphy's Law took over and everything that could go wrong with the system has gone wrong. We expect to have positrons again soon, although we won't be able to go to full spec intensity because some of the components still do not meet specs. We are rebuilding those components and expect to have them finished in a few months.
2. *What can I say about the damping rings?* As you know, the south damping ring ran reasonably well some two years ago but has been rebuilt to eliminate the complicated dipole/sextupole combined function magnets. The rebuilding is complete and we are starting to try to get beam into the ring again. The north damping ring is running routinely and we are quite pleased with its performance.
3. *Are all the 4-poles, etc. in the main linac?* Yes, although I'm not sure what the 'etc.' is in the question. We have not yet run the entire linac with all of the new systems. We have run everything up to the positron extraction line (Sector 20 — the two-thirds point). The system works well. See also answer to question 5.
4. *How many klystrons are ready?* We have 177 new klystrons actually installed in the gallery (enough to make Z's!) and another 50 which have been accepted for gallery installation so we are close to having the ability to fill all gallery sockets (240). Gallery lifetime for klystrons is reasonably good so far. Since we are running at very low rep rate we really do not have any information about tube lifetime at 120 Hertz.
5. *Any beam positioning in the main linac?* Yes, we have extensively tested both automatic energy feedback/correction and automatic steering in the first ten sectors of the linac and they work well.

–Don Getz

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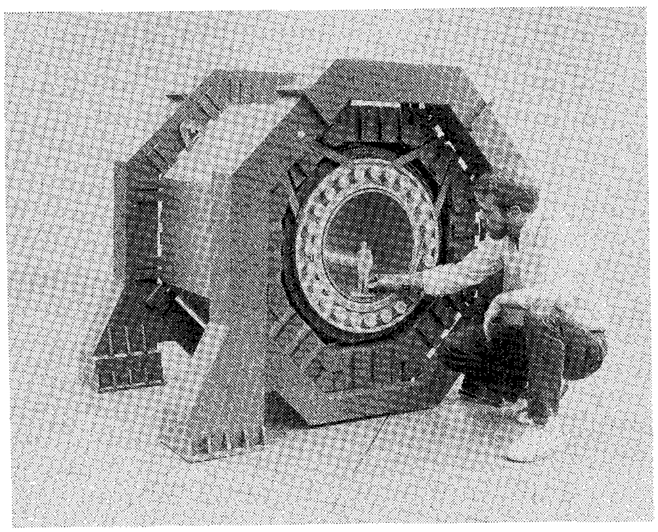
SLD — A NEW DETECTOR

Here we go again. The *Mark II* is hogging the headlines and the front cover, and the *Beam Line* just gives us a few square inches on an inside page to show a little toy model. The *Mark II* dubs itself the Nomadic Detector and wanders the halls from *SPEAR* to *PEP* and now to the Collider, and all we have is a name that no one understands — *SLD*, what's that?



First, about that model. It's no toy, but an accurate one-eighth scale model built from the shop drawings that are being used to construct the actual detector. Engineer Martin Nordby, pictured with the device, worked with his colleagues and a shop in Menlo Park to produce the mock up. It is being used to study the fits between the many pieces that make up the detector — details that don't stand out on a line drawing.

But it still looks kind of small when you're used to looking at real detectors. Even multiplying it in your head by eight doesn't overwhelm the senses. So try this: imagine this model standing taller than the Central Lab building and holding a typical detector inside.

Now, the name. High-energy physicists love acronyms — the field is *HEP*, our lab is *SLAC*, we're building the *SLC* to follow *SPEAR* and *PEP*, and detector names run from *ASP* to *MAC*. (The *Marks I, II,* and *III* don't fit this scheme, of course, but that's just one exception with repetitions.)

A name like *SLD* just cries out for definition. Unfortunately, we don't have a good one, and as a consequence we have been variously baptized by the well-intentioned. We have been the Stanford Linear Detector and the Stanford Linac Detector. But *SLD* is far from being a lean, linear object and we do not plan to detect linacs.

The lore is that *SLD* began as a proposal for Slick Little Detector. This was to be a complete detector for the collider based on the small silicon chips called *CCDs*. Such a detector would indeed be a midget among mammoths. As the proposal incorporated other elements, however, it grew. Although the central element of the *SLD* is still a beercan-sized array of *CCDs*, the complete system will be the largest facility at *SLAC*.

So, maybe *SLD* should be *SLC*'s Large Detector. Since the *S* in *SLC* stands for *SLAC*, this makes our machine an acronym within an acronym within an acronym. Something like Stanford Linear Accelerator Center Linear Collider Large Detector. Elegant; five dollars to the best proposal for a better definition.

Names, sizes, and a little friendly competition have their place, but what is this business all about? Why two detectors, why a big detector, and what are we detecting?

The Collider is a completely new kind of machine for producing high energy collisions between electrons and positrons. It is not like building a larger *PEP* or *SPEAR*, and there will be some new problems — such as how to tune the machine to avoid large backgrounds in the experiment. New experiments and detectors also take time to understand, even when used at a machine that's been running for a while. Installing a new experiment at a new machine would be double trouble. Better to start with an experiment that is already well understood, so that all effort can be concentrated on making the machine work. This is where the *Mark II* comes in.

The *Mark II* has run and taken physics data at two smaller colliding beam machines. During its moves it has been improved and refitted, so that today it is still a first class experiment with the advantage of being thoroughly tested and understood. The *Mark II* will work the first time.

But there are limits to renovation. Certain features of the detector depend on size, such as the ability to contain and measure precisely some of the produced particles. To fully measure the energy of these more energetic events requires a physically larger detector. The bulk of the *SLD* is in the steel and inner lead structures that will do just that. The other difference is in new techniques for particle detection, some of which are designed for the unique properties of the collider. These devices will show more of what happens in these higher-energy collisions. But these new ideas will take time to develop, understand, and debug. Enter, *SLD*.

Meanwhile, we count. In 160 days, most of the pieces of our 4000-ton experiment will arrive at *SLAC* for assembly in the Collider Hall. Then we begin counting again — to the day that the wandering stops and civilization begins.

–Bill Ash

ASP — LAST GASP

The *ASP* detector was proposed and approved in the spring of 1983, several years after the other *PEP* detectors had already started taking data. Only one *PEP* interaction region was unoccupied at the time, and naturally it was the smallest and least accessible of the six experimental areas. The only access to *IR*-10 was either down a seventy-foot shaft or along the arcs from neighboring *IR*-8 or *IR*-12. Still it seemed like a good match: *ASP* would be the smallest of the *PEP* detectors, and its modular design permitted every piece to pass through the narrow arcs.

Eighteen months and many trips along the arcs later, *ASP* was fully installed in *IR*-10 and taking data. In the next two years an integrated luminosity of 117 pb^{-1} was collected, exceeding the design goal of 100 pb^{-1}. Both the skill of the *PEP* operators and the reliability of the *ASP* detector contributed to a short but successful career at *PEP*. This past summer *ASP* was removed from *IR*-10 and put in mothballs, less than 3 1/2 years after it was first proposed. It is unusual for a high energy physics experiment to be finished in less time than most graduate students in theoretical physics take to get their degrees!

The *ASP* detector was different from the average colliding beam detector in many ways. Instead of trying to be a general purpose detector capable of probing a wide variety of physics, *ASP* was designed with a very particular piece of physics in mind. The goal was to detect the production of particles which do not interact with matter, or interact only very weakly. Such particles are by definition impossible to detect directly. However, if a photon is radiated from the electron or positron before they interact, the process is detectable. Only a single photon will be observed, and the absence of anything else in the event indicates the presence of weakly-interacting particles.

For example, neutrino pairs can be produced in e^+e^- annihilation together with a radiated photon:

$$e^+e^- \rightarrow \gamma\nu\bar{\nu}. \qquad (1)$$

This is the only source of single-photon events predicted by the Standard Model of electro-weak interactions. This cross section is calculable, yielding a prediction for the number of single photons expected from the three known generations of light neutrinos. The observation of significantly more single photons than could be attributed to process (1) would be evidence for new physics. The extra weakly interacting particles could be additional generations of light neutrinos, or possibly a completely new type of particle such as a spin-1/2 photon, or photino. The photino is predicted (along with many other new particles) by theories of supersymmetry. Searching for single photons therefore provides a window to new physics, or in the absence of an anomalous signal, can set limits on extensions of the Standard Model. With this in mind, *ASP* was designed to detect Anomalous Single Photons with greater sensitivity than any previous experiment — and hence its name.

To achieve this goal, the *ASP* detector was optimized for sensitive and accurate detection of electromagnetic showers, with nearly complete coverage of the solid angle around the interaction point. Photons are reconstructed in 632 lead-glass bars, arranged in four quadrants of five layers which surround the interaction point down to 20° in polar angle (see Fig. 1). The bars are staggered from layer to layer to eliminate cracks and provide optimal directional resolution. Charged particle tracking in the region between the beam pipe and the lead glass calorimeter is provided by planes of proportional wire tubes parallel to the beam line. Further down the beam pipe on both sides of the central calorimeter, there are lead and scintillator calorimeter modules which extend the coverage down to 1.2° from the beam line. Above this angle no particle could escape detection unless it was a neutrino, photino, or other weakly interacting particle.

When the full data sample from the *ASP* experiment was analyzed only one single photon event was found, consistent with the predictions of the Standard Model for three generations of light neutrinos.

(Continued on page 5.)

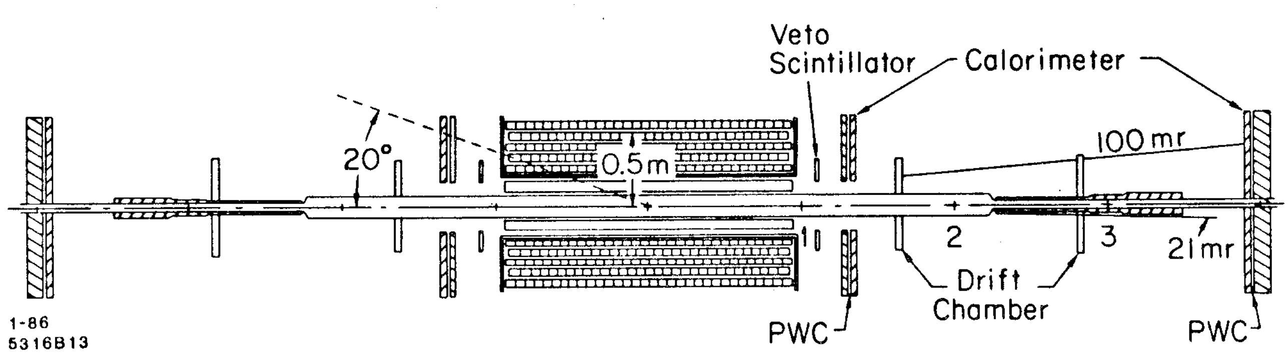
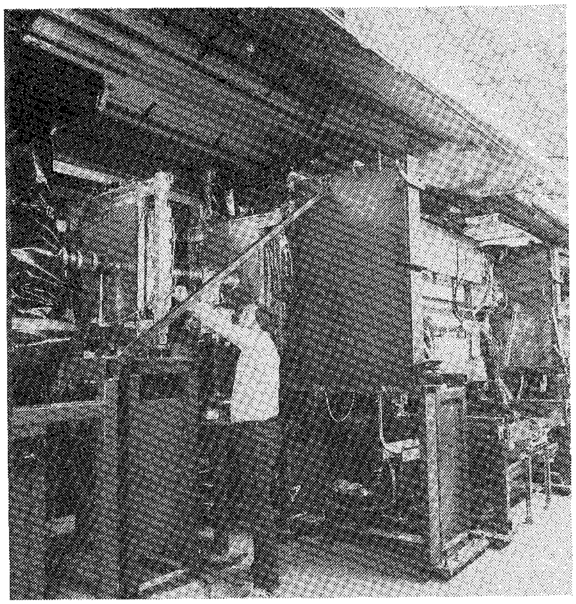


Figure 1: The ASP Detector. Two quadrants of the lead glass bars are visible in the center of this view. The forward calorimeters are located on either side.



(Continued from page 4.)

Although it was disappointing not to find evidence for new physics with the *ASP* detector at *PEP*, this result set significantly more stringent limits on some important parameters of supersymmetric models. In addition, a 90% C.L. upper limit of 7.5 was placed on the number of light neutrino generations. This is the best limit available from an e^+e^- experiment, and it is a much cleaner measurement than those obtained from the *CERN* proton-antiproton collider, where one must rely heavily on a number of assumptions borrowed from *QCD*. The number of light neutrinos is of great interest to both particle physicists and cosmologists, who predict from the big bang model of nucleo-synthesis that there are just three or four generations. To further improve the experimental limit, a higher energy collider is needed. For example, at *SLC* a similar experiment could unequivocally determine the number of light neutrinos.

Other analyses of *ASP* data are getting underway. These include a search for single electrons, analyses of two- and four-prong events with missing momentum transverse to the beam line, and a study of some two-photon processes. Results from all of these research efforts will be forthcoming in the next year.

The *ASP* detector has shown that, despite the trend towards larger detectors and collaborations, bigger is not always better. It was a satisfying experience for everyone involved with *ASP* to work with a small, dedicated group on a detector of modest size. The vindication of the Standard Model in this experiment just serves to whet our appetites for new physics from *SLC*.

–Natalie Roe

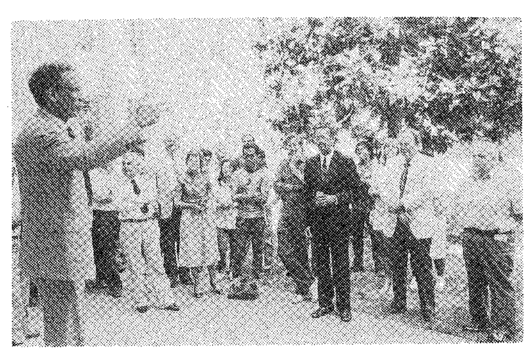
SLAC PROGRAM WINS AWARD

Stanford University President Donald Kennedy and Provost James Rosse visited *SLAC* on Wednesday, July 30, to present the laboratory with Stanford's first Affirmative Action Recognition Award for the Summer Science Program *(SSP)* and to personally acknowledge members of our staff who each year contribute their time, energy, and expertise to the program. About fifty people attended the event including program lecturers, supervisors, administrative staff, and this year's group of participants.

Dr. David Griffiths, Director of *SSP*, *MC*'d the event. He lauded the program as one of the finest of its type in the country. *SLAC* Director Burton Richter briefly reviewed the history of the *SSP*. He acknowledged the large cadre of volunteers who provide direct support to the program and cited those people who have played major roles in the past. Provost Rosse commented that the lesson a good program such as *SSP* provides is that it must be institutionally supported and have the input of persons throughout the organization. President Kennedy stated that four affirmative action awards will be presented by the University this year and *SSP* is the only program to receive this recognition. Other winners are departments whose prime tasks involve direct affirmative action responsibilities.

Kennedy stated that opportunities in the sciences are generally limited and there have been few role models for minorities and women, a combination which has kept affirmative action target groups from choosing careers in the sciences. He believes that new opportunities will occur in the 1990s, that this window will be short-lived, and that a program such as *SSP* will help minorities and women to see personal opportunities within the sciences when they may take advantage of career opportunities occurring in the next decade.

–Hilda Korner



The event honoring the Summer Science Program ended on a social note, with guests staying for refreshments and conversation.

PATENT STORY

A collaboration of physicists has developed an invention that will improve the accuracy and reduce the size of future colliding beam detectors. A patent for the Microplex Chip was awarded by the *US* Patent Office to James Terry Walker of Stanford University, Sherwood Parker of the University of Hawaii, Bernard Hyams of *CERN*, and Steven Shapiro of *SLAC* on June 3, 1986. Shapiro was presented an achievement award by *SLAC* Director Burton Richter on July 25, joining 58 others who have been awarded or involved in 70 patents during *SLAC's* 25 years. A showcase in the Auditorium breezeway lists names and inventions in chronological order.

Hyams initiated the project and provided the initial specifications, later slightly modified by Walker and Parker. Walker did the original design and most of the redesign resulting from Parker's numerical simulation. Parker also performed testing and some redesign. Hyams' group at *CERN*, along with Parker, was the first to use it. Shapiro provided advice and support during the chip's development.

The chip is designed for use in conjunction with a microstrip detector. Its purpose is readout and storage of very low level voltage signals and for readout and accumulation of signals from numerous strips of a microstrip detector. It then transfers this information to the electronics which measures the signals and forwards the information to a computer.

A microstrip detector is composed of a piece of silicon with implanted strips, typically 100 to 1000 or more, spaced as close as 20 to 25 microns apart. As the particle to be detected passes through the strip, electrons are released and collected by the strips on the surface of the detector. The detector functions as a number of parallel-connected diodes whose outputs are individually read out, amplified, integrated (to find the sum of the charge from that strip), and stored on a storage capacitor inside the microplex chip. The sums from the 128 channels of the chip, as well as the channels of other chips, if desired, are then output onto a single wire pair.

Older chip designs were too large for placement close to the detector, resulting in inaccurate voltage readouts because of the low charge levels detected. The microplex chip's extremely small size allows it to be placed close to the collision point of particles and achieve much higher sensitivity and, therefore, accuracy. More important, it permits the use of silicon strip detectors in the extremely crowded central region of a colliding beam detector. These proposed detectors must fit tens to hundreds of thousands of channels into a region a few inches across. In contrast, using old technology, a six-foot diameter fanout would be required before any electronics, to read out a detector less than one inch across.

Another problem the new chip addresses is the high power drain on the detection system caused by amplifying the signals from the microstrip to a level high enough for detection. The microplex chip reduces the power requirements and the overall energy drain on the system by amplifying the signals in an energy-efficient manner.

Before the patent was awarded to Stanford University, *DOE* had the opportunity to apply for it. The chip has been licensed for commercial development by Analytek, Ltd. It has other potential applications including medical imaging.

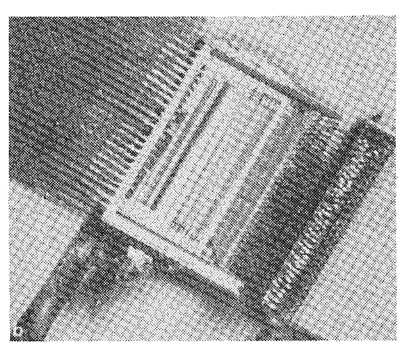
Herman Murphy, the Inventions Administrator at *SLAC*, guides people through the somewhat tortuous invention disclosure and patent application process. He provides Stanford University and the *DOE* with information about inventions to fulfill contract obligations. Murphy said, "I try to identify what should be reported to *DOE*, who makes the determination [whether] to patent or not."

Stanford University reserves first right of refusal for any invention patented by a member of the faculty or staff, including *SLAC* and Hospital employees. If they do not apply for the patent, the *DOE* — for *SLAC* employees only — then can choose whether it wants to apply. If the *DOE* refuses as well, the decision rests with the inventor(s). This can be a major decision as patent application fees can be quite expensive.

The Stevenson-Wydler Act of 1980 was passed to promote the transfer of technology stemming from government-funded research to other government agencies, educational institutions, and private industry. Government agencies are exempt from paying any royalties for the use of these technologies.

Murphy works closely with Stanford's Office of Technology Licensing, which makes the decision whether or not to claim the rights to an invention. He submits patent information simultaneously to *DOE* and the university. The microplex chip is the latest in a long line of innovations thought of or worked on by people at *SLAC*; there certainly will be more in the future.

–D. Thorneycroft



Roger McConnell

ROGER McCONNELL

Roger McConnell, who recently took early retirement, was an early member of the *SLAC* design team. Coming to *SLAC* from Varian Associates in 1962, he joined the Microwave Circuitry Group and worked on the linac drive system. In 1965 he was assigned to Burt Richter's Group C storage ring design team to work on the rf system. He became a storage ring rf system expert and made significant contributions to the rf systems for *SPEAR*, *PEP* and the Damping Rings.

Together with his busy career he was very active outside *SLAC*. He built his own house in the mountains behind *SLAC*. He served on the Regional Water Quality Control Board as a member and chairman. In 1976 he took a year's leave to build a ranch house and start a ranch in Mariposa. An engineering company located in Mariposa offered Roger a challenging assignment, prompting him to take early retirement from *SLAC*. According to Roger it was quite a wrench leaving *SLAC* and his many friends after 24 years here but certainly helped the commute!

Roger, who was a History graduate of *UC* Berkeley, switched to electrical engineering and obtained a BS in Electrical Engineering. He is also a talented poet. The finest example of his poetic talent is a composition entitled, "Speakwocky" reprinted here from the August 1974 issue of the *Beam Line*.

His many friends at *SLAC* wish Roger, *SLAC's* Renaissance Man, much enjoyment and happiness in his new position and his ranching in Mariposa.

–Matt Allen

KUDOS TO BLOOD DONORS

Many thanks to the 75 people who took an hour out of their busy schedules to donate at the Stanford University Blood Bank *(SUBB)* Mobile Drive at *SLAC* on Tuesday, September 23. Remember the next mobile drive at *SLAC* is scheduled for December 16.

SPEARWOCKY

(Dedicated to the SPEAR operators)

'Twas brillig, and the slithy beams
Did gyre and gimble in the ring:
All mimsy were the cavities
And the Sigma-5 did sing.

"Beware the Physicist, my son!
The jaws that bite, the claws that tweak!
Beware the Engineer, and shun
The frumious Vacuum Leak!"

He took his vorpal switch in hand:
Long time the manxome beams he sought –
So rested there with a can of beer,
And stared awhile in thought.

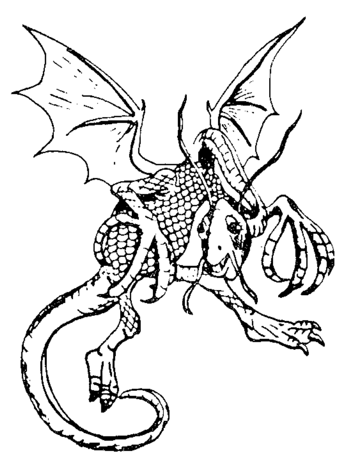
And, as in uffish thought he stared,
The Physicist, with eyes of flame,
Came whiffling through the tulgey yard,
And burbled as it came!

One, two! One, two! And through and through
The vorpal switch went snicker-snack!
He left it dead, and with its head
He standardized right back.

"And hast thou slain the Physicist?
Come to my arms, my beamish boy!
O frabjous day! Callooh! Callay!"
He chortled in his joy.

'Twas brillig, and the slithy beams
Did gyre and gimble in the ring:
All mimsy were the cavities
And the Sigma-5 did sing.

–Roger McConnell



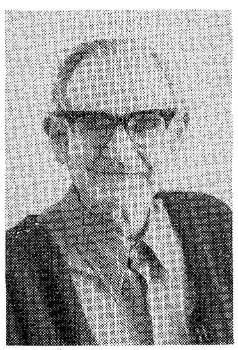
DICK McCALL — HEALTH PHYSICS FELLOW

Dick McCall, Head of the Radiation Physics Group, has just been made a Fellow in the Health Physics Society of America, an honor held by less than 50 people out of a total membership of almost 7000. This honor comes not for a single piece of work, but for a career spanning almost 30 years, more than 20 of which have been spent at *SLAC*. So, in a way, this is also an honor for *SLAC*.

Dick has been Group Leader of Radiation Physics (originally Health Physics) and Radiation Safety Office since 1964. He has served on many national scientific committees over the years, including two *ANSI* committees, the *DOE* Advisory Panel on Accelerator Radiation Safety, and the International Commission on Radiation Units (*ICRU* Report 28 on High Energy and Space Radiation Dosimetry). Most recently he chaired a committee on neutron contamination from electron accelerators, which has written an important tome *(NCRP-79)* on that subject. Our congratulations go to Dick McCall.

–W. (Ralph) Nelson & Ted Jenkins

CALDWELL LEAVES LEP



Has the paging system been hung up when you tried to use it? Has your handie-talkie ever crapped out? You say you dropped your pager in the beer at lunch at Zott's and it only gurgles at you now when you get a call? Well, Bunkie, I'll tell you who to call to solve all your problems: Carl Caldwell in the Laboratory Electronics Pool *(LEP)*. Wait a minute, you can't call Carl — he retired June 30, 1986. If you get gurgle out of that paging receiver, you will just have to learn Gurgle in order to use that beer-soaked instrument from now on.

As a good-by and salute to Carl, I thought I would make you aware of how important Carl was to us. He took care of *all* the pager receivers that came into *LEP* for repair and fixed them, even when dropped from 400 feet into a water-filled ditch that was being graded so that the pager was then run over by the grader. He fixed all the handie-talkies, all the vehicle radios, the paging system transmitter, the wired control stations for the operations and security transmitters, and the transmitters themselves. He diagrammed and coordinated all the system cables so that we could keep up with changes on site. He maintained the *SLAC* tunnel radio system. He helped maintain the microwave links to Stanford campus and to Berkeley. I hope you get the idea he was an invaluable part of the service pool at *SLAC*, which has about 600 radio units.

Let me give you a little background on Carl so you can better understand how he was able to cope with this enormous responsibility. Carl was born in Montana in 1917. His father was a contractor and general handyman. In looking for work during the years after World War I the family moved around and wound up in Washington, *DC*. Carl received his high school education from Roosevelt High in *DC* and went to work for his father in the contracting business when he got out of high school.

The family moved to Louisiana in 1940 and Carl went to the Merchant Marine section of the Gulf Radio School. He got a second class radio telephone and telegraph operator's license from the school. About this time, World War II started and Carl wound up in the Merchant Marine Radio Operators Union and shipped out on the *SS Suwied* (pronounced sweed) as the radioman *Sparks*. The ship carried cargo throughout the Caribbean and to South America during the war. One time, while sitting in Port of Spain Trinidad, a cargo ship anchored next to his ship was blown up by a German sub.

In 1942 Carl joined Pan Am and became a radio operator on Pan Am's South American runs, flying in a number of airplanes including Sikorsky S42s, S43s and Douglas DC-3s as far south as the Amazon and Orinoco rivers in South America. He chalked up about 4000 hours flight time for Pan Am. Pretty adventurous for our Carl, huh?

In 1948 Carl continued to follow his radio career and joined radio station *KDSH* in Boise, Idaho. He was a radio engineer/announcer for them and later did the same job for *KWC*, the first educational station in the Northwest, at the Washington State University in Pullman, *WA*.

In 1957 Carl came to the Bay Area to seek better medical services for his daughter. He worked for a number of companies such as Sandia, Ampex, and Comcore; when Comcore closed, he came to work for *SLAC*. That was in 1966. He was hired into the Instrument Shop by Jim Williams and worked for a number of supervisors — Les Horton, Bill Laden, John Ashton, Bill again, and lastly for Don Farwell. Notice he didn't retire until he went to work for Farwell (life is tough sometimes).

Carl was quiet, organized, and very effective as our radio repairman. He sure kept *SLAC* radio communication systems together. We will miss him dearly, *but* we will also envy him for his new-found freedom.

–Don Farwell

Ralph Hashagen

TENNIS, ANYONE?

How can one limit to 200 words the *SLAC* and Naval careers of Ralph Hashagen who stepped down as *SLAC's* first Purchasing Officer on July 31, 1986 — next to impossible, we say!

After some 40 odd years of sitting, Ralph decided it was time to sharpen his tennis skills. He bought an oversized racquet, visited Dick Gould, Stanford Men's Tennis Coach, and headed for the Woodside Road Tennis Courts to take on all comers in serious follies. We understand he has lost none of his intensity, except maybe when playing with the 'well turned ankle' group.

He served in the Supply Corps of the United States Navy under Admiral Hyman Rickover. He was on the staff of the Commander in Chief, Pacific Fleet. His other assignments are too numerous to mention except for the Ships Parts Control Center in Mechanicsburg, Pennsylvania — servicing the entire Naval Fleet. He reports the latter assignment to be one of his most challenging tests.

After a short stint at Aero-Jet General in Sacramento, Ralph and his wife, Mary Ruth, decided they preferred the cooler climate of the Palo Alto area. At the urging of Fred Pindar Ralph joined *SLAC*'s staff as Purchasing Officer in April 1962 to organize a procurement function to meet the challenges of construction of the two-mile Linac. Historians report that the accelerator was built "on schedule and within budget," a notable achievement for all those participating. He was personally involved in buying the more than 2,000,000 pounds of copper for the accelerator tube.

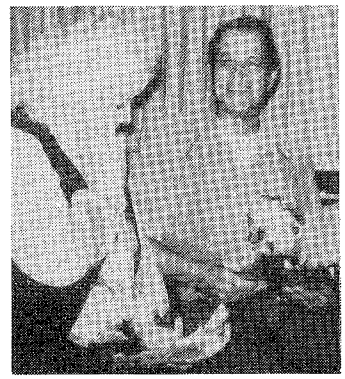
Ralph's official retirement date is during the month of November. In the meantime, you may see him in the hallways of the *A&E* Building which are bedecked with small business and small disadvantaged business procurement awards won during his administration. He will be assisting Gene Rickansrud on special projects.

Ralph and Mary Ruth plan to remain in Woodside for now but you can be sure they will burn up the roads between Woodside and Modesto, where their daughter and grandchildren reside. We will miss you, Ralph.

–Larry Womack
Purchasing Department

John Barreiro

THE TRUTH IS OUT!



We all knew that John Barreiro, *SLAC*'s Stores Manager, played his cards pretty close to his chest in dealing with all of you. Now that John has retired, he will be moving close to the casinos in Carson, Nevada, where he is building a new home. John says that when he gets tired of doing housework, the two-block walk to the *Golden Nugget* will be good exercise.

Barreiro came to *SLAC* from the *US* Marine Corps, retiring as a Lt. Colonel after more than 20 years of service including World War II and the Korean conflict. One outstanding attribute was his keen interest in the well-being of personnel he supervised — to the point that Joe or Jane's toothache was also John's. Through his tireless efforts during the early 60s John organized and developed the Stores, Shipping & Receiving function under Ralph Hashagen, Purchasing Officer, as a viable part of the Laboratory. In the early days, when Shipping & Receiving was located in a tent next to Building M-1, John could routinely be seen climbing over and kicking boxes. During the latter part of 1964, he moved his operation to the present *SLAC* Site, changed his Marine Corps' haircut, took off his tie, and settled down to run a darn good organization.

John did not want fanfare on leaving *SLAC* for a well deserved retirement. Instead he chose to fade away like all good Marines. We wish you many loaded hands in your retirement, JB.

–Larry Womack
Stores/Shipping & Receiving

MARGUERITE BUS SERVICE

The Marguerite Bus provides service between *SLAC* and Varian Physics on Campus on Monday through Friday. The shuttle departs from behind the Central Laboratory (across from Sector 17 Gate) between 8:45 am and 5:45 pm every half hour. The shuttle departs from Varian (near Serra Street and Via Crespi) between 9:00 am and 5:30 pm every half hour. This shuttle is on a trial basis; ridership will determine whether service is continued.

LARRY KARVONEN

Larry Karvonen started working at *SLAC* in 1965 joining the small cadre of engineers under Jim Walling working with Burt Richter's Group C storage ring design group. He tackled many of the novel and challenging problems of this new field. A major assignment was the rf system. He designed and supervised the building of all the rf cavities for the *SLAC* storage rings — *SPEAR*, *PEP*, and *SLC* Damping.

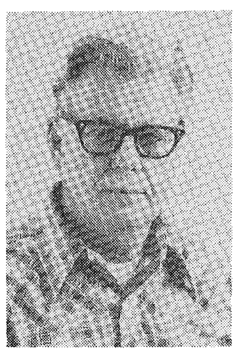
His designs were sought by all the other laboratories in the world working on storage rings. Many visitors beat their way to Larry's office to get his expert advice and counsel. Larry has always been an avid traveler and an outdoorsman; in fact his initial activity on his retirement is an around-the-country trip on his well appointed and most comfortable fifth wheeler. After this trip he will move into his recently purchased home in Ukiah.

As the spirit moves Larry, we hope we might see him back at *SLAC* as a consultant on various problems which would benefit from the Karvonen engineering touch. We all enjoyed his ready wit and interesting conversations recalling his youthful experiences growing up on a float house on the Columbia River and commercial fishing in Oregon and in Alaska.

All his many friends at *SLAC* wish Larry and Pat Karvonen a long and happy retirement.

–Matt Allen

HOWARD WEBB



Down in the trenches a few tough, tenacious, mostly anonymous, men are locked in combat. Their performance will, in the long run, determine whether the game is won or lost. They don't enjoy the adulation of the crowd. What they do is primarily appreciated and best understood by their teammates and a few aficionados.

So goes a modern-day dictum which is not confined to the game of football but applies to other fields of endeavor including modern day scientific research.

Howard Webb is a man who played an analogous role at *SLAC* for nearly 22 years. He never let up until the 15*th* day of May — the day he retired. He was a tough and tenacious team leader, appreciated by his colleagues for what he knew and what he could do, and admired by aficionados and knowledgeable observers for much the same reason.

Howard was born in the third decade of this century, a product of mid-America. He possesses those virtues one would expect in a man who spent his formative years in Missouri: a dedication to family and country and a belief in the value of hard work. By his own words, he has had only two jobs in his lifetime — both equal in length.

Webb began his first job at a tender age and at a time when his country was at peril. He enlisted in the *US* Navy in 1942 and was introduced to the field of electronics as a Radioman. When he retired in 1964 he had risen in rank to Master Chief. At that time he was supervising 43 instructors who in turn were training Navy personnel on airborne radar systems on the P3A Orion aircraft.

In the fall of '64 the two-mile machine was a mere infant. Only two sectors were operational. Howard began his second job at that time. In the first two years he worked in Sector 1 and 2, later as a coordinator in *EPC* and then as a supervisor of operating technicians. He then rejoined *ELD* as a shift supervisor in the Klystron Gallery. In the ensuing 20 years Howard accumulated a vast storehouse of knowledge relative to the accelerator. For this and a dedication to his work, he was highly esteemed by superior and subordinate alike.

Howard has started the third phase of his life. He is retired from *SLAC* and he and his wife Jean have retired from their home in Fremont to a new home in the foothills of the Sierra. For the contributions he made and the talents he brought to *SLAC* he will be missed by the beefy boys down in the trenches, by the aficionados of the 'game' and by his many friends at the Lab. Good luck, Mr. Webb.

–John Ashton

JOHN JASBERG — MR. SAFETY

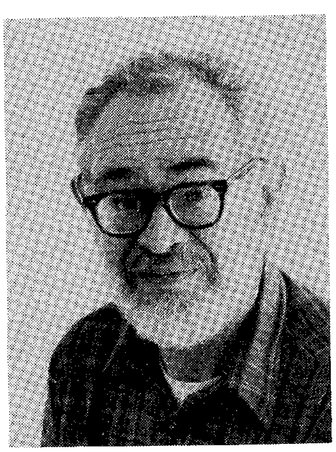
John Jasberg retired from *SLAC* on June 30, 1986. When I came to Stanford University in 1950 John was already hard at work at what was then the Microwave Laboratory in designing microwave equipment for the 1-GeV *Mark III* Linear Accelerator. Much of the hardware with which we are now routinely familiar at *SLAC* was created during those early days. John stayed at the *Mark III* and participated in the many 'jam sessions' which led to the formation of what was to become the design of *SLAC*. Once *SLAC* became a reality John became one of its key staff members.

John's main preoccupation for most of his career at *SLAC* was safety in general and radiation safety in particular. He deserves a great deal of the credit for the fact that during its 24 years of existence since groundbreaking, *SLAC* has not had a single radiation accident. This is no mean accomplishment: there is nothing in the laws of physics which prevents a beam from a linear accelerator from getting out. It takes good design and, above all, conscientious management to keep the beam confined.

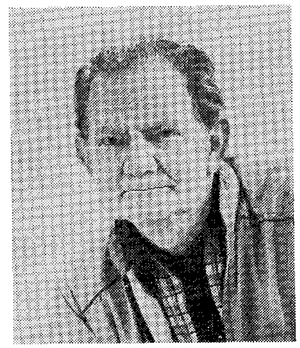
John was mainly responsible for the system which requires an independent review of radiation safety each time the configuration of *SLAC*'s beams is changed. John's concern with safety transcended into other spheres. One principle in driving which I found very useful was to change lanes when noticing Jasberg's car ahead!

John Jasberg is one of the kindest and most considerate people I know. He would make sure that his associates were well taken care of; when noticing that someone was cold he procured heaters and when someone was uncomfortable he found pillows. He is greatly interested in music and I am sure that this interest will be pursued during retirement. We are grateful to John and wish him the very best.

–*Wolfgang K. H. Panofsky*



John (Jas) Jasberg



Charles (Chuck) Lacy

In Memoriam – –

CHARLES E. LACY

Chuck was born on January 10, 1923, in Coffeeville, Kansas and succumbed to cancer on June 9, 1986, in South San Francisco, California. Between those two events lived a fellow who liked to work and who seemed to know the words to all of the popular songs.

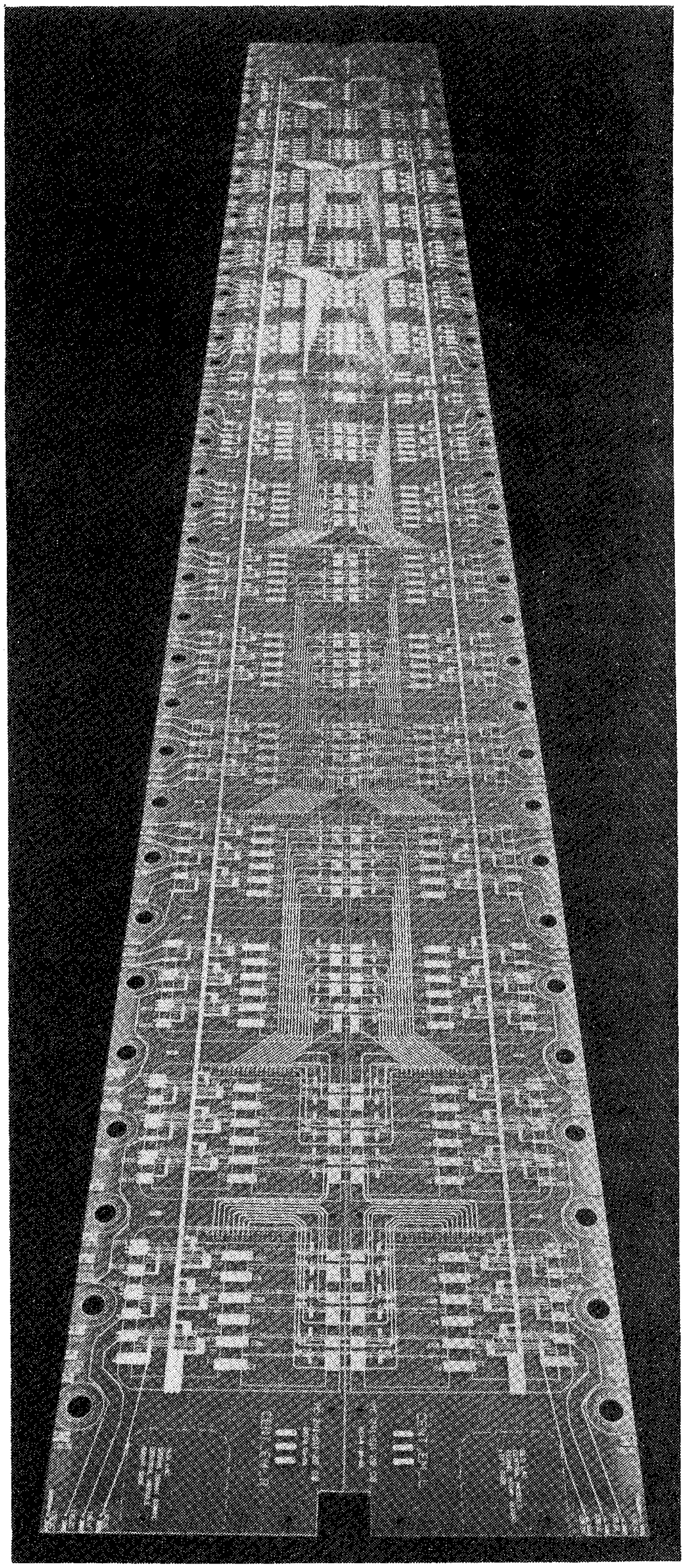
Chuck went to work at Lawrence Radiation Labs *(LRL)* fresh from working on B-17s and B-24s. Two questions on the *LRL* employment application show Chuck's sense of humor. *Question: What did you like most?* Answer: Flying. *Question: What did you like least?* Answer: Being shot at. One time he was in an informal contest at *LRL* and won the title of the World's Best Silver Solderer.

From *LRL* where he worked with vacuum measuring instruments for the vacuum lab operations and as an accelerator operator, Chuck went to work for the *MD&F* unit at *SLAC* in August of 1962. He stayed with *MD&F* for about 4 years and then moved to the Bubble Chamber Group, where his general knowledge and specific skills contributed greatly to the success of the Bubble Chambers at *SLAC* during his 13-year tenure in that group. In fact, one of the dewar heat exchangers that he fabricated bore his name.

In 1979 Chuck transferred to the Klystron Department, where he excelled in prototype and specialized projects. Many people at Stanford had contact with Chuck while he was an officer of the *USW*. He also had many outside interests despite his long-term disability, enjoying his work on H production sports cars, bowling on *SLAC* teams, and running a Boy Scout troop.

Chuck will be remembered for his expertise in many fields and the professional flair with which he finished diverse projects.

–*C. Griffin, D. Allen & J. Cockroft*



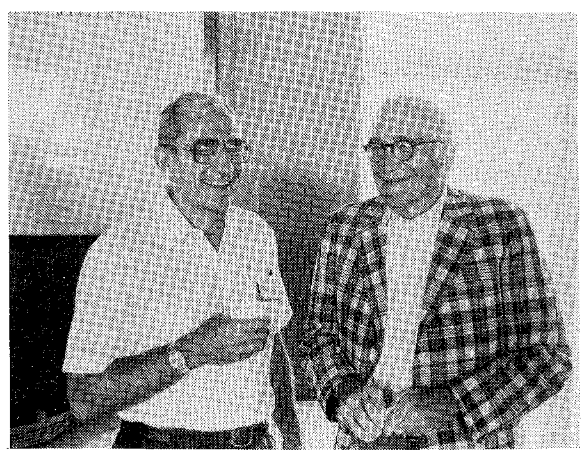
ART AND ARCHITECTURE It's not a new face on the San Francisco skyline, but an end view of a 6-foot long circuit board for the liquid argon calorimeter of the SLD. What's an SLD? See page 3.

SUMMER INSTITUTE

The 14*th* *SLAC* Summer Institute on Particle Physics was held from July 28 – August 8 on "Probing the Standard Model." Three hundred and forty-three physicists gathered to study the topic. Lectures were given by theorists and experimentalists on Electroweak Theory, Perturbative *QCD* and Heavy Quark Systems. Lectures also included computing, data acquisition, and designing electronics for high energy physics. Provocateurs provided supplementary material to the morning's lectures, enlivening the afternoon sessions. Speakers represented major collaborations around the world and spoke on the most recent results from their experiments in high energy physics.

The Institute was highlighted by the opening reception in the Rodin Sculpture Garden on campus and concluded with an early celebration of the 60*th* birthday of Sid Drell, *SLAC*'s Deputy Director. This tribute was attended by many of Sid's colleagues and former students. Marvin Goldberger, President of Caltech, spoke on Sid's involvement in arms control. Former students of Sid's contributed to the program. Robert Jaffe, now a professor at *MIT*, spoke on Composite Models. James Bjorken, currently Research Director at Fermilab, gave a history of elementary particle physics for the past 50 years. Dick Blankenbecler acted as host and introduced the speakers. A champagne reception with birthday cake concluded this event.

–Eileen Brennan



SLAC RUN — TEE-SHIRT CONTEST

The 15*th* Annual *SLAC* Run will feature a new logo. Submit a design for the *SLAC* run; have your name in the annals of history and win two tee-shirts!

Designs should be camera ready and 10 1/2" x 10 1/2" in size. Send to Pat Wurster at Bin 24 or deliver to Room 142 in the *A&E* Bldg by October 15, 1986. For further details contact Pat Wurster (x2833) or Karen Fant (x3499).