There are therefore Agents in Nature able to make the Particles of Bodies stick together by very strong Attractions. And it is the Business of experimental Philosophy to find them out.”—Isaac Newton, Opticks (1704)

The punctured hemisphere in this striking photograph is half of the sodium iodide crystal holder for the "Crystal Ball". It will be part of the detection apparatus for Experiment SP-24 presently scheduled to be installed in the SPEAR East Pit next summer. Bill Seaton is the welder.

--Photo by Joe Faust

EDITOR'S NOTE

The November issue of the Beam Line commemorated the award of the 1976 Nobel Prize in Physics to Burton Richter of SLAC and Samuel C.C. Ting of MIT. In this issue we are "playing catch-up"—trying to report the more mundane happenings of the last two months.

One of these happenings put Bill Kirk's right arm in a plaster cast so don't blame him for any mistakes in this issue. H.A.W.

SLAC Christmas Party
at 12:30, Tuesday, Dec 21
in the
Cafeteria Breezeway
Food, Entertainment, Prizes
Come One, Come All
Various shielding arrangements were built around the target, simulating shielding designs which could be considered for the PEP experimental areas.

The test was mounted at short notice through the cooperative efforts of a large number of people. The results were successful in resolving some of the uncertainties and defining shielding designs which potentially save several hundred thousand dollars.

--John Harris

In order to solve some of these problems for the PEP experimental areas a test was carried out using the SLAC electron beam impinging on a target downbeam of End Station A.

The Rigging Crew builds up shielding to model the PEP experimental areas. Joe Trevino is the man on top.

PEP INTERACTION REGION SHIELDING TEST

One of the major questions in building a new machine is how much shielding will be required. Radiation shielding is expensive and also complicates access to equipment, particularly in the experimental areas. Often, attempts to design shielding based on calculation are not successful because of unknowns about the way in which the different kinds of radiation are absorbed, reflected or channeled by different parts of the structure. If there is uncertainty in the calculations one has little alternative but to add extra shielding, using precious funds which could be used for experimental equipment.

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COURSES FOR STAFF DEVELOPMENT WINTER QUARTER 1977

The following courses will be given on campus and at the Palo Alto Center of Foothill College during winter quarter, 1977. For course descriptions and information about registering, call Staff Development Services, 74671 or 71648.

<table>
<thead>
<tr>
<th>Supervision Courses - Association for Continuing Education</th>
<th>Special Interest Courses</th>
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<tr>
<td>Elements of Supervision TTh 1/4-3/17 12:00-1:00p</td>
<td>Introduction to Computer Technology Th 1/6-3/17 5:00-6:45p</td>
</tr>
<tr>
<td>Management and Organizational Behavior Th 1/6-3/17 5:00-6:45p</td>
<td>Introduction to Micro-computers T 1/4-2/8 5:00-7:00p</td>
</tr>
<tr>
<td>Supervision Courses - Foothill College*</td>
<td>Accounting for Managers T 1/4-3/15 5:00-6:45p</td>
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<tr>
<td>Supervisory Techniques A M 1/3-3/21 5:30-7:20p</td>
<td>Digital Signal Processing MW 1/3-3/14 12:00-1:00p</td>
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<tr>
<td>Supervisory Techniques B T 1/4-3/22 5:30-7:20p</td>
<td>Think Metric M 1/3-1/31 5:00-6:45p</td>
</tr>
<tr>
<td>Employee Motivation Th 1/6-3/24 5:30-7:20p</td>
<td>S.I. Metric System M 1/3-3/14 5:00-6:45p</td>
</tr>
<tr>
<td>Labor-Management Relations F 1/7-3/25 4:00-6:50p</td>
<td>Library Technical Assisting: Acquisitions MW 1/3-3/23 12:00-1:30p</td>
</tr>
<tr>
<td>Fair-Employment Practices W 1/5-3/23 5:30-7:20p</td>
<td>Reading Efficiency TTh 1/18/39 12:00-1:00p</td>
</tr>
<tr>
<td></td>
<td>Communicating Successfully F 2/25-3/18 12:00-1:00p</td>
</tr>
<tr>
<td></td>
<td>Time Management NWF 3/7-3/18 12:00-1:00p</td>
</tr>
</tbody>
</table>

*Palo Alto Center of Foothill College, 320 Lytton Avenue. Residents of the San Mateo Junior College District must obtain releases prior to registering for Foothill College courses.

DID MUSTER MARK EAT QUARK?

The Germans have a delicious alternative to serving rich pastry or cake for snacks with coffee or tea. It's called quark or weisskäse, which means cottage cheese. The cheese is whipped, then presented with condiments and toast.

To make enough for four servings, turn 1 pint large curd cottage cheese into a blender. Whirl, starting and stopping blender often to push cheese into blades, until it is smooth and creamy.

For each serving, surround whipped cheese on a plate with several little piles of condiments, such as sliced onion, or chopped onion, thinly sliced radishes, alfalfa sprouts, chopped parsley, crumbled crisp bacon, and caraway seed. Serve with toasted, thinly sliced whole wheat or French bread or English muffins. Spread toast with cheese, then pile on the extras.

--Sunset
November 1976

---Photo by Joe Faust

The Channel 5 television crew is shown in the Klystron Gallery during the filming of the TV feature about SLAC--How Little is Little. The telecast is scheduled for December 26th at 8:30 P.M.
The Stanford Synchrotron Radiation Project (SSRP) is inviting proposals for use of its new high-intensity tunable beam line. It was tested successfully on November 16, 1976 and is expected to be fully operational by early 1977. By means of a double-focusing toroidal mirror and a two-crystal monochromator, the new beam delivers about 50 times the photon flux and about 250 times higher flux density than other SSRP beams.

Peter Eisenberger and Brian Kincaid of Bell Labs, and Jerry Hastings of the SSRP staff were primarily responsible for the development to the new beam line. They were assisted by a large number of people at SSRP, particularly Walt Basinger, John Cerino, Bob Filippi, Ernie Moss, Ben Salsburg, and graduate students Debbie Jackson and Tom Eccles. Gary Warren of SLAC Health Physics worked closely with the SSRP staff in developing a flexible design within radiation safety restrictions.

Peter Eisenberger of Bell Labs (left) and Jerry Hastings of the SSRP staff flank the monochromator box.

The X-ray beam enters the monochromator via the tube on the right. The monochromatic beam then enters the experimental "hutch", the large box in the background at the left.

Mary Lou Arnold helps Frank Martinez hold his stained glass window for the Beam Line photographer (Joe Faust). The fish is a Moorish Idol.

STAINED GLASS ART

I enrolled in a stained glass art course and met my teacher, Darla Zdarko (who by the way is the wife of physicist Dick Zdarko of Stanford). I watched in fascination as she showed the class how to make pictures, jewel boxes, etc. out of glass. She cuts glass precisely and smoothly, then she flips the cutter and taps the other side of the score (cut) until the crack appears all through the cut. Both pieces fall apart in her hands. I always call her "Professor" for I have seen some of her work and it is beautiful.

I have completed my underwater scene with a Moorish Idol and I am hooked on this art. I made two jewelry boxes and I am now in the process of making a stained glass Tiffany lamp. Experience is the best master in cutting glass, you get better and better as the time goes on. Picking the right color glass for your picture is a very important factor for a realistic scene.

--Frank R. Martinez

Editor's Notes: If you're interested in learning more about stained glass art, Frank has offered to give advice. His extension is 2707. Did you know that a full sized Tiffany lamp costs $500?

CREF Unit Value as of October 1976 . . $40.62

SAN FRANCISCO SPORTS AND BOAT SHOW

SLAC Benefits Office has half-price tickets for the San Francisco Sports and Boats Show which will be held at the Cow Palace next month. Holders of these tickets will be admitted for $1.25 on Wednesday, January 12th (one day only).
ROBERT STAGNER RETIRES

Most of us look forward to retirement after one successful career but this is Bob Stagner's second time around and he's still not ready for the sedentary life.

Born in southwest Texas near the Rio Grande he spent his first twenty-one years in Dallas before joining the U.S. Navy in 1932, a depression year. He spent eight years aboard destroyers, three of them in the Asiatic Fleet. At the beginning of World War II, he transferred to submarine duty, received an officer's commission, and subsequently participated in four war patrols in the Pacific. After the war Bob was assigned to shore duty as the officer in charge of ten Navy recruiting substations in North Carolina, South Carolina and part of Georgia. A licensed pilot, he flew all of his inspection trips. Some of the recruits got the "red carpet treatment". Bob flew them to the main recruiting office in Columbia, South Carolina to be sworn in. A tour of shore duty in the reserve fleet at Orange, Texas followed and in 1956, after 24 years of active duty, Bob retired with the rank of Lt. Commander.

"I thought I'd seen enough salt in various forms in the previous 24 years so I did not think it improper for an 'Old Salt' to work for the Morton Salt Co." says Bob, and so for a year he worked there as a master mechanic. It was at this time that Bob's wife, Hazel, who had lived in Vallejo, sold him on the idea of returning to Northern California. In 1957, they packed all they owned and relocated to Antioch where Bob worked for the Crown Zellerbach Paper Co. In 1958, he was employed by the Lawrence Radiation Laboratory at Berkeley in the Bubble Chamber group. When the 82" Bubble Chamber moved to SLAC in 1967, he elected to move with it.

Bob's "retirement" will be spent in boating, fishing and knocking around the back country on his new trail bike in search of rocks for his collection. As if that weren't enough, he has developed a passion for baking sour dough bread which has led to cooking and collecting cook books. After a trip to Alaska in his camper next spring, there's the possibility that he and Hazel will extend their travels to eastern Canada.

Bob says that he will miss SLAC and the great team of people in the Bubble Chamber Group. "If I don't learn to navigate one of those darned rockin' chairs, I just might live to be a hundred." and you can bet he will be working on it! We all wish you the very best in this new adventure, Bob--retirement.

--Rhea Price

Andy Vega is a well known man-about SLAC. The handsome medals on his collar were presented to him last November by a visiting Soviet scientist, Dr. Anatol Glazkov of Moscow University, in appreciation for a guided tour of SLAC.

Andy's taxi covers about 600 miles a week carrying 900 passengers. He takes special pleasure in conducting tours for visiting dignitaries. If you need a ride, just call Ext. 2220--you can get a closer look at his souvenirs on the way.

--Wendy Wheaton
RALPH LEWIS RETIRES

Ralph Lewis at his retirement party with one of his farewell gifts (not the shielding block, dummy, the beam tree).

The other photo shows how Ralph's fellow workers made sure he would not miss his party.

After 11½ years on SLAC's Precision Alignment Team, Ralph is thinking of building a retreat in the Sierra foothills. We wish you all the best, Ralph. (Photos by Gene Whicker)

TEN-YEAR SERVICE AWARDS
1966-1976

Anderson, Roger
Asher, Wesley
Baggs, Ronald
Barrera, Antonio
Beeman, Earl
Berg, Anna Laura
Bertolucci, Boris
Brodsky, Stanley
Broers, Wouter
Burnside, Laval
Caldwell, Carl
Camp, K. Don
Carrell, David
Cutler, Percy
Danielson, Donald
DeAguero, Porfie
Feathers, Larry
Ferrell, Everett
Fisher, Mary A.
Fraser, Donald
Galliano, John
Giannotti, Madeline
Gonzales, John
Grant, John
Griffin, John
Gustavson, David
Heinen, Norbert
Hiatt, Marianne
Holt, Everett
Hunter, Tatiana
Ibrisimovic, Danny
Itani, Victor
Jensen, Sharon
Johnson, Billy
Jones, Marvin
Koib, Catherine
Leino, Arthur
Leith, David
Lewis, Marie
McCabe, Charles
McCarthy, Francis
McNerney, Edward
Maes, Joe
Minsky, Wade
Money, Marilyn
Munoz, Benjamin
Nichols, Marguerite
Nicholson, M. Annette
Petty, Vernon
Porter, James
Potter, Aubory
Rann, James
Reed, Bette
Roach, Albert
Romback, Herbert
Royal, Clifford
Russell, Barbara
Sherman, George
Stevens, Ernest
Stewart, Glenda
Stoddard, Michael
Swartzentruber, Lester
Tavares, Gilbert
Taylor, Harold
Taylor, John
Thomas, Jr., Henry
Torres, Richard
Trevino, Jose
West, Donald
Withhaus, James
Wood, Donald
Zahn, Charles

(Our apologies to anyone we may have inadvertently overlooked in writing down this list of service awards.)

CHRISTMAS CHARTERS
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ONWARD AND UPWARD WITH STORAGE RINGS

[Reprinted from Science News, May 4, 1976]

The collision and annihilation of electrons and positrons is one of the hottest forms of experiment in physics today, and promises to be one of the longest running. For more than a year now, three such experiments have been running (in Palo Alto, Calif., Hamburg, West Germany, and Frascati, Italy) in devices called storage rings, which build up and collide counterrotating beams of the two kinds of particle. After the annihilation of matter and antimatter that occurs in the collision, ultraheavy, oddly behaving new particles appear along with other unusual phenomena. Week by week and month by month, as the energy of the electron and positron beams is gradually raised, a seemingly endless succession of discoveries is reported.

The whole thing has greatly excited both experimental and theoretical physicists. They want it to continue, but in the present machines the parade will come to an end when energies about 7 billion electron-volts (7 GeV) are reached. Naturally, physicists have planned and begged for a second generation of $e^+e^-$ storage rings with an energy range up to about 20 GeV.

It now appears that at least two of these will come into being, one in the United States and one in Europe. Funds to begin the apparatus called PEP (because it will be able to collide positrons, electrons and protons with one another) are part of the U.S. government's fiscal 1977 budget proposal. PEP is a joint project of the Stanford Linear Accelerator Center and the Lawrence Berkeley Laboratory. Meanwhile, near Hamburg, construction has begun on what may turn out to be the sole European entry in this second generation. A similar Italian proposal is apparently dying of unbenign neglect by the Italian bureaucracy. The British government has given a definite no to the Rutherford Laboratory's proposal.

The new German machine will be called PETRA (Positron Electron Tandem Ring Accelerator). It represents the next step in the escalation of a laboratory that began as the Deutsches Elektronen-Synchrotron (DESY, pronounced "daisy") and later added a storage ring called DORIS. Now there will be PETRA, which will provide electron and positron beams at energies between 5 and 19 GeV per beam.

With an extremely tight construction schedule, the Germans expect PETRA to deliver its first particle beams by 1979. If all goes well and too much political grandstanding does not interfere, PEP should be ready shortly after. On the time scale on which big-physics experiments are planned and assembled it is by no means too early to begin thinking about experiments for the new generation.

A conference to discuss what should be done at PETRA gathered recently at Frascati. It included 200 physicists from all over Europe and some from the United States, Japan and Israel. Its international flavor, as the CERN Courier points out in reviewing the meeting, reflects the "degree of integration which has been achieved in the high energy physics community." That integration comes about largely because of CERN, an internationally funded and operated laboratory. But PETRA will be strictly a German national accelerator, and the almost reflexive way in which DESY joined the Italian Istituto Nazionale di Fisica Nucleare to organize an international conference to talk about what to do with it indicates how deeply the influence of CERN has been assimilated as well as the expense of this sort of operation.

To quote CERN Courier again, PETRA will move "into an unpredictable range of physics." Theorists are not without ideas about what will be found, but theorists' predictions have so often been wrong before that the experimentalists were not stampeded. Apparently there was very little of the "I would like to look for so and so and so" at the meeting. Nobody seems willing to stake much on what "so and so and so" is likely to be in this especially surprising branch of physics.

Basically there is only one experiment that can be done at a colliding beam facility; surround the collision points with an array of detectors and record everything that happens. The colliding beams essentially stop each other cold, and the products of their interaction can come off in any direction. The difference in experiments is what kinds of detectors a given group uses and in what order and configuration they pile them.

The most nerve-twisting question is whether to submit a design based on available detectors of known capability or to take a gamble on the development of new varieties, which may be able to find rarer or more delicate phenomena than present ones. Space and experimental time are both severely limited, and it could be a losing game to wait on the development of new detectors only to find, by the time they were ready, that all the available places were taken and one had to wait another five years to get an elbow in. Trying to decide whether the greater advantage is being first in line or whether it is promising new and exotic detection techniques may be keeping some European physicists awake nights.... In September DESY will hold a workshop on the PETRA program, and decisions about the first experiments to go in are expected in October. When Germans do something, they don't fool around.

--Dietrick E. Thomsen
STRAIGHT-A ILLITERACY SHOULD BE WIPED OUT

[The following excerpts are reprinted from an article of the above title written by James P. Degnan, who teaches writing at the University of Santa Clara.]

... I am in my office, and I am at work, doing what must be done if one is to assist in the cure of a disease that, over the years, I have come to call straight-A illiteracy. I am interrogating, I am cross-examining, I am probing for the meaning of a student's paper. The student is a college senior with a straight-A average, an extremely bright, highly articulate student who has just been awarded a coveted fellowship to one of the nation's outstanding graduate schools.

He and I have been at this, have been going over his paper sentence by sentence, word by word, for an hour. "The choice of exogenous variables in relation to multi-collinearity," I hear myself reading from his paper, "is contingent upon the derivations of certain multiple correlation coefficients." I pause to catch my breath. "Now that statement," I address the student--whom I shall call, allegorically, Mr. Bright--"that statement, Mr. Bright--what on earth does it mean?" Mr. Bright, his brow furrowed, tries mightily. Finally, with both of us combining our linguistic and imaginative resources, finally, after what seems another hour, we decode it. We decide exactly what it is that Mr. Bright is trying to say, what he really wants to say, which is: "Supply determines demand."

Over the past decade or so, I have known many students like him, many college seniors suffering from Bright's disease. It attacks the best minds, and gradually destroys the critical faculties, making it impossible for the sufferer to detect gibberish in his own writing or in that of others. During the years of higher education it grows worse, reaching its terminal stage, typically, when its victim receives his Ph.D. . . .

The ordinary illiterate--perhaps providentially protected from college and graduate school--might say: "Then people down at the shop better stock up on what our customers need, or we ain't gonna be in business long." Not our man. Taking his cure from years of higher education, years of reading the textbooks and professional journals that are the major sources of his affliction, he writes: "The focus of concentration must rest upon objectives centered around the knowledge of customer areas so that a sophisticated awareness of those areas can serve as an entrepreneurial filter to screen what is relevant from what is irrelevant to future commitments." For writing such gibberish he is awarded Straight A's on his papers (both samples quoted above were taken from papers that received A's) . . .

MURPHY'S LAWS

Murphy's First Law
Nothing is as easy as it looks.

Murphy's Second Law
Everything takes longer than you think.

Murphy's Third Law
In any field of scientific endeavor, anything that can go wrong will go wrong.

Murphy's Fourth Law
If there is a possibility of several things going wrong, the one that will cause the most damage will be the one to go wrong first.

Murphy's Fifth Law
If anything just cannot go wrong, it will anyway.

Murphy's Sixth Law
If you perceive that there are four possible ways in which a procedure can go wrong, and circumvent these, then a fifth way, unprepared for, will promptly develop.

Murphy's Seventh Law
Left to themselves, things tend to go from bad to worse.

43 women voted to adopt a set of By-Laws for a SLAC Women's Organization. Membership is open to present and former employees, visitors and guests at SLAC. The first meeting will be Monday, January 10th at Noon in the Orange Rm.