SLAC USERS BULLETIN NO. 96

AUGUST - DECEMBER 1983

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NOTICES

NEXT EPAC MEETING MAY 4,5, 1984

NEXT SPC MEETING JUNE 8,9, 1984

SLAC's Scientific Policy Committee

The interests of SLAC's User community are represented by the SLAC Scientific Policy Committee, which meets several times a year to review SLAC's program and policies, its relationship with Users, and the like. Users and prospective Users of the SLAC facility are invited to address any problems or suggestions they may have to any of the members of the SPC. The present membership of the SPC is given below.

Term expires June 30, 1984

E. Goldwasser	(Chairman)	U. Illinois	D. Jackson	LBL-UCB
J. Bjorken		Fermilab	U. Nauenberg	U. Colorado
C.-Y. Chien		John Hopkins U.	R. Prepost	U. Wisconsin
B. Gittelman		Cornell U.		

Term expires June 30, 1986

C. Baltay	Columbia U.	E. Picasso	CERN
C. Buchanan	UCLA	P. Reardon	Princeton U.
C. Callan	Princeton U.	A. Stewart-Smith	Princeton U.
D. Nygren	LBL-UCB	H. Ticho	UCLA

SLAC's Experimental Program Advisory Committee

The Experimental Program Advisory Committee (EPAC) consists of twelve members and advises the Director of SLAC in establishing the program commitments for the accelerator and experimental facilities. Meetings are scheduled as often as necessary, but no less than twice a year. All new proposals submitted to the EPAC two months before a given EPAC meeting will be considered at that meeting.

Proposals for experiments at SLAC should be sent to the EPAC Secretary, David Fryberger, SLAC, Bin 20. For details of proposal preparation and submittal, please refer to the SLAC Users Handbook.

Term Expires 1984

Karl Berkelman	Cornell University	Gerald Smith	Pennsylvania State Univ.
William Carithers	Lawrence Berkeley Lab	Richard Taylor	SLAC
Michel Davier	Orsay	Albert Wattenberg	University of Illinois
Paul Grannis	SUNY-Stony Brook	Sau Lan Wu	U. Wisconsin and DESY
Helen Quinn	SLAC		

Term Expires 1985

Robert Jaffe	M.I.T.	Melvyn Shochet	University of Chicago
Robert Sugar	U.C.-Santa Barbara	Gunther Wolf	DESY

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Stanford Linear Accelerator Center*
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SLAC--96

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DISCLAIMER

1. EXPERIMENTAL ACTIVITY

A. General

Following a three-month summer shutdown in the experimental area the accelerator operated in the SLED mode at 60 pps for most of October through December. In the PEP ring two projects which were hoped to bring high luminosity and more reliable operation were completed in September: (1) The entire ring was realigned, and (2) the two families of sextupole magnets were powered independently, which may allow lower beta at the IP's. After the shutdown PEP had difficulty storing a beam, and when stable operation was finally achieved, the luminosity was approximately half that of the previous cycle. The realignment did not help a bit, in fact it made things worse! From experience it was felt that with continued tweaking by the operators, the luminosity would gradually improve; so PEP continued to operate uninterrupted for experiments through most of December. Both HRS and TPC suffered setbacks. HRS had refrigerator problems which forced a decision to warm up the coil. The cooldown went much better than expected and the experiment was back on-line by early December. TPC had difficulty with the superconducting coil supports and will not be able to start testing the magnet again until about April 1984. They are expected to be back onto the PEP beam line in September 1984. They are also using this time to make several modifications to the TPC and to repair two of the six barrel calorimeter modules. The TPC problem also keeps Two-Gamma off. When the accelerator turned off on 23 December for a scheduled ten-day shutdown PEP had accumulated about 23 inverse picobarns. During the short shutdown a new vacuum pipe and masking and several detector components were installed in IR-10 for PEP-21 (Anomalous Photon Search). In IR-2 a new nine-meter mask was installed for Two-Gamma to test a BGO detector for tagging very small angle (4-10 mrad) electron positron scattering.

SPEAR also had trouble storing a beam following the summer shutdown and could not reproduce the luminosity attained in previous cycles for MARK III. In November and December SPEAR switched to single beam operation for SSRL.

In End Station C Experiment BC-75 (Charm Study in the SLAC Hybrid Facility) ran in October and early November in the backscattered laser beam. During the last three weeks of November the photon beam energy was changed from 20 GeV to 10 GeV for BC-76 (Threshold Enhancement in Associated Charm Meson-Charmed Baryon Production). A quick scan of the 10 GeV run was completed by mid-December and turned up no charmed lambda events, so data-taking for that experiment is concluded.

In End Station B, channeling experiment D-30 ran in the positron beam, sharing the cycle with several other tests. The hadron test beam was also active for SLD detector development work. (L. Keller)

B. Program Status and Reports of Experiments and Tests

Figure 1 is a research area plan showing the location of experiments and facilities. Figure 2 shows locations of the experimental beam lines in the research area. Figure 3 shows the Long-Range Schedule. Table I is a list of presently approved high energy experiments. The right hand column of Table I gives the status and activity of each experiment during the cycle.

BC-75 - Charm Photoproduction at 20 GeV - (G. Kalmus, Rutherford Lab., and K. Moffeit, SLAC)

BC-75 finished data taking December 22 with 645,000 pictures obtained between October and December 1983. Work is in progress on the analysis of this data and that taken in the spring. A collaboration workshop was held at SLAC December 12-16 to scrutinize new charm event candidates. (K. Moffeit)

BC-76 - Threshold Enhancement in Charm Photoproduction - Univ. Birmingham, Imperial College (London), Rutherford Lab., U.C. Berkeley, Univ. of Tennessee, SLAC, MIT - (B. Franek, Univ. Birmingham, J. Brau, Univ. Tennessee)

A proposal to exploit a threshold enhancement in charm photoproduction (BC-76) at the SLAC Hybrid Facility was approved by the EPAC on November 1, contingent upon a demonstration that the enhancement exists. To test the theoretical prediction of the enhancement, the photon beam serving the SLAC Hybrid Facility was converted from its normal 20 GeV operation to 10.5 GeV on November 4. This low energy beam was established by running the laser with

frequency doubled (rather than quadrupled) photons and running the linac at 23.3 GeV. The component changes required for this switch-over were accomplished in a few hours on November 4, but due to linac tests, productive running was only established by November 6. Between then and November 19, despite numerous interruptions for linac tests, 100,000 pictures were taken for the BC-76 test.

This film was scanned by the collaboration for evidence of charm using procedures developed for BC-73 and BC-75. The film scanning was over ninety percent completed by December 12, with no evidence for charm production appearing. A paper is in preparation reporting the cross section limit demanded by this null result. (J. Brau)

D-30 - Channeling Radiation - (C. R. Sun, SUNY-Albany)

Repairs on the goniometer were completed toward the end of summer, 1983. It was replaced in the positron beam line and in early November when beam became available we began to systematically map out all the planes in the diamond crystal. The next item was to study the angular dependence of the channeling radiation spectrum. We took many runs with a 4 mm diameter collimator set at various distances from the straightforward position. This scan was done for both the horizontal and vertical directions. Thus a set of spectra for different angles of emission were obtained for an incident positron energy of 4 GeV. The last item on the agenda was to repeat the 10 GeV runs at the highest possible repetition rate. It was immediately before this run that the goniometer broke down once again. The problem this time has proven to be in the electronic controls and is presently being repaired. (M. Pisharody)

PEP-5 - General Survey of Particle Production at PEP (MARK II) SLAC, LBL, Harvard (N. Lockyer - SLAC)

After the summer shutdown, the MARK II detector was ready for the first PEP beams delivered this cycle. Improvements to the drift chambers during the summer were successful and the time-of-flight system laser was reconditioned and operates more reliably now. With 150 pb^{-1} of integrated luminosity accumulated thus far at PEP, studies of particle lifetimes using the high precision vertex detector, new particle searches and jet properties are continuing. Throughout the fall cycle the detector operated reliably and by the middle of December, 16 pb^{-1} of luminosity had been recorded. (N. Lockyer)

PEP-6 - Magnetic Calorimeter Detector to Study Electron/Positron Collisions (MAC) - Univ. Colorado, Frascati, Univ. Houston, Northeastern Univ., SLAC/Stanford Univ., Univ. Utah, Univ. Wisconsin (R. Weinstein, Univ. Houston)

The MAC detector performed very well throughout the cycle. During the summer access a large effort had been committed to extending the detector's small angle tagging capabilities. A lead/proportional chamber sandwich was installed to provide efficient detection down to 5 degrees from the beam direction, plus scintillators to give additional tagging down to 2.5 degrees. This work was successful, and the system was operational for the initial luminosity delivered by PEP. Energy thresholds for the single photon trigger were lowered after last spring's test running, and using the new tagging system we are now able to veto conventional sources of single photons with $P_\perp$ greater than 3 GeV, as demonstrated by this fall's data. Results from the spring test data, setting useful limits on the supersymmetric electron mass, have already been published.

Modifications to the dE/dx system were also made over the summer to eliminate common-mode pickup originating from the PEP beams. During the cycle this system was brought up fully and is now recording data.

The speed of the PASS 1 analysis has been improved by about a factor of two, reducing the load on the IBM system. BITNET has been installed on the IR-4 VAX; although too slow for data transfer, it serves as a useful backup to the LLA for source files and allows interactive messages to be passed between the VAX and IBM systems.

Finally, although we have been disappointed by the relatively small integrated luminosity ($\sim$ 20 pb^{-1}) delivered this cycle by PEP, we are hoping that this winter's run can deliver sufficient data to provide the payback for the efforts of the summer and fall. (R. Messner)

PEP-12 - High Resolution Spectrometer - ANL, Indiana Univ., Univ. of Michigan, Purdue, LBL, and SLAC - (D. Meyer, Univ. of Michigan and M. Derrick, ANL)

During the fall cycle the HRS has collected 9.3 inverse picobarns of data. This relatively low number is partially due to the slow start for PEP luminosity and partly to cryogenic difficulties with the magnet and its refrigerator. During the cooldown in September, several of the cooling circuits that intercept the heat conducted down the magnet coil supports became plugged. After valiant attempts by the Cryogenic Group to handle the additional heat load by refrigerator modifications were unsuccessful, the magnet was warmed to room temperature, purged of contaminants, and cooled down in about six weeks (record speed!) By this time, PEP was beginning to work reliably, though at half last spring's luminosity.

At the end of December we completed the production analysis of our 1982-83 data. Preliminary studies on D^o (both $K\pi$ and $K\pi\pi$ modes), D^*, ϕ, K^o, and Λ production, and tau's were continued from this summer on a selected subsample of that data. Jet studies were continued on the fully analyzed 1981-82 data. Preliminary work on using the Cerenkov tagging in D and ϕ analyses was started. (S. Gray)

PEP-20 - DELCO at PEP - CalTech, SLAC/Stanford Univ. (J. Kirkby, Stanford Univ.)

During the fall 1983 cycle, DELCO operated smoothly and logged 20 pb^{-1} of data. These were the first data taken after installation of new Al-Hexcell-Al laminate central vacuum chamber (of thickness $0.6\%X_o$). This chamber is important both in reducing gamma conversion backgrounds and in minimizing lifetime-measurement errors from multiple Coulomb scattering. The detector is now well-optimized for lifetime measurements; we are achieving inner drift chamber resolutions of between 120-150 μ.

Analysis of the data is also proceeding well. We have submitted for publication the first measurements from PEP/PETRA of prompt electron production over almost the full kinematic range, $0.5 < p > 5.5$ GeV/c. We expect 1984 to be a productive year for DELCO results. (J. Kirkby)

SP-32 - Studies of Weak Decays of D Mesons at the " Resonance Cal Tech., SLAC, U. C. Santa Cruz, Univ. of Illinois, Univ. of Washington (D. Hitlin, Cal. Tech.)

Experiment SP-32 attempted to begin data-taking in mid-October following the long summer shutdown. Unfortunately, for reasons not fully understood, the luminosity obtained this fall at the center-of-mass energy of the ψ'' meson (3.88 GeV) was about a factor of three lower than that obtained at the same energy last spring. After the SPEAR operations staff tried for a couple of weeks—with little success--to understand why the luminosity was so low, SP-32 decided to cancel the remainder of its scheduled experimental time for October and November. Hopefully, the problems will have been found and fixed by January 1984, the month when SP-32 is scheduled to begin data-taking again. (D. Coward)

T-345 - Background Measurement in End Station A (R. G. Arnold, American University)

The purpose of this test was to measure the background in scintillator detectors in a shielded counter cave in End Station A with a 2.3 GeV electron beam stopped in the end station in a shielded dump. A small water-cooled dump was installed in a concrete hut on the beam line 80 feet downstream of the pivot. Scintillation counters in the 8 GeV/c spectrometer hut were used to measure the room background with the spectrometer at angles of 15 degrees to 35 degrees to the incident beam. With momentum set at 2.5 GeV a 5% radiation lngth Al target was placed at the pivot. Measurements were taken with the target in and out and with the spectrometer entrance slits open and closed. The results indicate that room background from the multiple scattering in the target and from the dump will be low enough to allow operation of a recoil spectrometer at 0 degrees to the incident beam with the electron beam dumped in the end station. (R. Arnold)

2. PEP DEVELOPMENTS

The first three weeks of October were spent recovering from the summer shutdown. In addition to the expected hardware problems, several errors were found which lengthened the turn-on and tune-up period.

During the last week of October PEP returned to physics production although the luminosity was well below the record breaking luminosity level of last spring.

November was the first full month of physics production runs at PEP of the FY'84 running cycle. Although the performance improved somewhat during the month, the luminosity was still below last cycle's level. About 10% of the running time was used for dedicated physics studies to try to understand this difference in performance.

PEP ran moderately well throughout December until the scheduled two-week Christmas shutdown which began December 23. The average luminosity per shift improved to 170 nb^{-1} which is still considerably less than was achieved last year.

The major activities planned for the Christmas shutdown included the installation of interaction region chamber for the new experiment PEP-21, the installation of a new synchrotron radiation mask assembly for the two-photon experiment and the nitriding of an RF cavity to suppress multipactor. (E. Paterson)

Operating Record - August - December 1983

	Hours	% of Scheduled Operating Time
Scheduled Downtime	309	
Scheduled Operating Time	1155	
Hours Nov./Dec.	1464	
Ring Downtime	206	18
Linac Downtime	143	12
Colliding Beams and Fill/Tune	800	70
Experiment Access	< 1	--

3. SPEAR ACTIVITIES

SPEAR began operations on October 10, having been delayed a week by construction delays in the completion of the new radio frequency system. The machine started up with a new RF system and with a new control system, having replaced the Sigma 5 computer with a VAX-750.

Single beam operations offered no start-up problems but the colliding beam luminosity was a factor of two or three lower than expected.

After a couple of weeks of intensive investigation of this problem without result colliding beam running was cancelled and the schedule was changed to dedicated operation for the synchrotron radiation users.

SPEAR continued running through December for SSRL, typically at 80 mA peak current at 3 GeV. Further work was done toward understanding the low luminosity in colliding beams. It was established that the luminosity monitor had suffered a slow degradation of sensitivity of 30-50% over a period of six to nine months. This was not sufficient to explain the factor of 2.5 to 3 loss of expected data rate experienced in October; but taken together with other minor improvements in luminosity, there was promise that colliding beam performance would be in the normal range when the machine starts up in January.

In other machine physics, several attempts were made to inject into the low emittance configuration, with only limited success. The new 54-pole hybrid wiggler (developed by SSRL/Exxon/LBL) has been characterized and shown to be compatible with storage ring operation. (J. Harris)

4. DATA ANALYSIS GROUP ACTIVITY

A. Hardware

In August installation of the VAX-11/780 computer system in MCC was finished except for a final increase in memory from four to six megabytes. Installation of the "PentaVAX" (five 11/750's) was finally completed in IR-6, and the machines are being used by HRS for off-line analysis. All 4000 feet of Ethernet cable was installed. The main run is from the Central Lab to the Computer Bldg. to End Station A to SPEAR. A second run from IR-8 to IR-10 ran out of cable 200 feet before it ran out of tunnel. An IBM PC/XT "personal" computer was delivered for use as part of a data aquisition system for SAMMI (SLC Arc Magnet Measuring Instrument). Most of the mechanical work on the carriage and support fixtures for the measuring devices is finished. The necessary measuring devices are all on hand: a so-called "Laser-Mike" aperture-measuring tool, a number of magnetic proximity sensors, and thermometers. We also have all CAMAC modules as well as a crate controller which will interface to the PC/XT.

First measurements were made with SAMMI in November. This device makes several hundred automatic measurements of various arc magnet mechanical dimensions in a few minutes, primarily the pole tip separation and the magnet sagitta. These measurements should provide a quicker (but otherwise acceptable) alternative to magnetic measurements for the purposes of quality control of magnet assembly.

A significant amount of Ethernet-related hardware was received during September. We got a short piece of cable in time to finish the installation of Ethernet between IR-8 and IR-10 before access to the PEP ring was stopped. We now have a total of 38 transceivers and 23 UNIBUS/transceiver interfaces. Some of these have been used to connect the End Station A, Crystal Ball, MARK III, and SPEAR VAXes to Ethernet, and to connect the five 750's and one 780 in IR-6 together. We also now have five repeater units which can be used to connect Ethernet cable segments together to form a larger network. SLAC now has a total of 96 ports (packaged in three boxes) which can be used to connect terminals to computers (primarily the 3081) over Ethernet. An additional two megabytes of 64K-chip memory were installed on the MCC VAX, raising the total to six megabytes. A 516-megabyte RP-07 disk drive was (finally) received, for installation on the MARK II VAX. This freed-up a 67-megabyte RM03 disk drive which was installed unsuccessfully at the Test Beam VAX in Building 265; to date there have been five head crashes and the unit still doesn't work. A package to upgrade the TPC 780 VAX to a 782 dual-processor system was ordered, as was a 750-based data acquisition system for PEP-21. The four VAXes used by PEP-9 in IR-2 were linked by a local Ethernet, which will provide more reliable computer-to-computer communication. Time-domain reflectometer measurements were made on all installed Ethernet cables; these are important in verifying proper Ethernet configurations.

In November a fourth "terminal server" (for connecting terminals or computer ports to Ethernet) was received from Bridge Communications, giving us a total of 128 Ethernet connections. The TPC VAX computer was hooked up to the local Ethernet in IR-2. The five VAXes there now have a fairly solid DECnet communication link with each other.

In December the upgrade kit to convert the TPC VAX-11/780 computer system into a dual-processor 11/782 was received but not installed. An engineering change for the bus interface used on most of the VAX 6250 bpi tape drive systems was received; it is designed to cure some annoying problems encountered when backing-up disk files. A schedule for testing and installation has yet to be worked out. A used tape drive was purchased from the Dutch group collaborating in the PEP-9 experiment and was installed on the Test Beam Facility 11/750 computer. An entire 11/750 computer system belonging to the PEP-9 Dutch group was borrowed and relocated in the second floor of the Computer Building, for use as a data acquisition system for PEP-21. It should be returned early in February, when the "real" PEP-21 system is scheduled to arrive. An electrostatic printer/plotter for this experiment has been received and installed. Ethernet cable was installed between IR-4 and IR-8 at PEP.

B. Software

In August release 3.4 of VMS (the VAX operating system) was received and installed in 18 out of 22 VAXes. An update for Bridge software (on their Ethernet communications servers) was received and installed. DEC loaned SLAC a PC350 personal computer

(basically a PDP-11/23 running RSX-11M+ with a different hardware and software frosting). Since it came with no programming language of its own it was not very useful. This month they delivered a software "toolkit" by means of which one prepares FORTRAN programs on a VAX and downloads them to the PC350. We will use this toolkit to help benchmark IBM's PC/XT with the PCB350. DECnet was run over Ethernet cable using Ethernet data-link protocols. It worked right away the first time and throughput was better than with our current 1 Mbit/second links.

VAX software to provide file transfer capability between VAXes and the 3081 was received from Interlan in September. This will require minor modifications to work with DEC (rather than Interlan) Ethernet interface hardware. A more significant effort will be required to "port" this software package to VM on the 3081. This work will extend over the next several months and be shared by several groups. A monitor program has been developed which collects statistics on an hourly basis from all 22 VAXes currently at SLAC, on system uptime, CPU usage, and hardware errors. This will provide useful information on comparative system and hardware performance over long periods of time. It is currently installed on the SLC VAX, although it could reside on any system.

In November PASCAL was installed on the SLC VAX. Most VAXes at SLAC have several utility accounts, primarily associated with testing and maintenance. Over the years these accounts have accumulated a fair number of privileges (i.e., the ability to perform powerful and customarily restricted operations), while at the same time their passwords have become fairly widely known. In an attempt to improve system security, privileges are being reduced and passwords changed for such accounts. In addition, individual system owners are requiring password changes for their own users.

All VAXes except the Test Beam Facility system are now at Release 3.4 of VMS. It was upgraded from Release 3.0 to 3.3; it needs to go one more step to 3.4. (J. Brown)

5. EPAC ACTIONS

The Experimental Program Advisory Committee (EPAC) met on November 4, 1983, with the following results.

(1) Linac Program

BC-76 (Associated Charm Production) was approved by the Director upon the advice of the EPAC, to do a test run of ten days. If ≥ 5 charmed events are seen in the test, a two-month run would be done next calendar year.

(2) PEP Program

The PEP-4 (TPC) and PEP-9 (2-Gamma) experiments were reviewed. The Committee was favorably impressed, and recommended that data taking by these two experiments be resumed with the high field superconducting magnet as soon as technically feasible. It is presumed that this would be in the Fall of 1984.

(3) Proposed Move of the HRS to Japan

The proposed move in the Summer of 1985 of the HRS to TRISTAN was reviewed. No reason was found why SLAC should stand in the way of such a proposal. (D. Fryberger)

BC-76 - Investigation of Threshold Enhancements in Associated Charm Meson-Charmed Baryon Production -- U. Birmingham, Imperial College (London), Rutherford Appleton Laboratory, University of California, Berkeley, University of Tennessee, SLAC, and MIT (Boda Franek, Rutherford-Appleton Laboratory and Jim Brau, University of Tennessee)

It was pointed out by Rubinstein and Stodolsky [Phys. Lett. 76B, 479 (1978)] that there could be a significant threshold enhancement in charmed meson--charmed baryon production a few hundred MeV above threshold. The size of this effect was

estimated to be of the order of 1 μb.

The explanation for the threshold enhancement in the case of associated charm production is exactly the same as that for the enhancement in $\Delta^{++}\pi^-$ photoproduction. In the latter case it was extremely successful in explaining the experimentally observed shape and magnitude of this enhancement. The value of $\sim$ 1 μb in the case of charm threshold enhancement is predicted taking into account phase space factors and quark mass differences.

The physics aims of this experiment are twofold: first, to establish whether the effect exists and what its magnitude is, and second, if it does exist, to provide a clean source of Λ_c's to investigate their properties. One notes that at 10.5 Gev gamma energy, any charm production has to be meson-baryon and therefore, the stable baryon has to be a Λ_c. Other physics questions can possibly also be addressed, e.g. the ratio of D^- to $\bar{D}^o$, which would have a bearing on D versus D^* production, etc.

The initial phase of the experiment will be a test for about 10 days at E_γ = 10.5 GeV in order to see if the signal is present at or near the predicted level. It is calculated that a sensitivity of 1 event passing all cuts/μb/day, assuming a detection efficiency of 0.1. No events seen in 10 usable days' running corresponds to an upper limit to the cross section (90 C.L.) of $\sim$ 250 nb. If 5 or more events are detected, then two months of running will be undertaken to complete the second phase of the experiment.

6. SLC ACTIVITIES

The Federal appropriations bill for FY 1984 which became law in mid-1983, contained $32 million to begin construction of the Stanford Linear Collider (SLC). The bids for the construction of nearly 9000 feet of collider tunnel and the junction with the accelerator housing were opened on September 15. A contract was signed in October, the ceremonial ground-breaking took place on October 31 and construction activity began shortly thereafter. The bid package for the North Damping Ring vault was mailed in mid-December.

The general features and size of the experimental hall have been established and detailed design is proceeding.

The klystron tube development program is proceeding well. A prototype tube has been operating at virtually full specification for some time: 5 microsec., full voltage, 46-48 MW, 180 pps.

Orders for magnet steel and for lamination stamping for the Arc magnets have been placed. The first laminations should arrive at SLAC in April.

SLC Milestone

At 5 o'clock on Saturday morning, February 4, the SLC passed a major technical milestone by accelerating a damped beam of 10^{10} electrons one-third of the way down the linac. The invariant emittance, which is a measure of how finely the beam can be focused, was 3×10^{-5} meter-radians and 5×10^{-5} meter-radians in the horizontal and vertical planes respectively.

The combination of intensity and emittance determines the luminosity which can be obtained by colliding two such beams. These emittances would yield a luminosity of approximately 10^{29} cm^{-2} sec^{-1} at the final focus of the SLC.

These experiments required many of the components of the linac control system for the collider. The beam from the high-intensity electron gun was accelerated to 950 MeV and injected into the damping ring. The damped beam was ejected from the ring 32 milliseconds later, reduced in length from one-half centimeter to one millimeter in a special bunch compressor, and reinjected into the linear accelerator. At the monitoring station one-third of the way down the two-mile linac, the beam (at an energy of 6.5 GeV) passed through a toroid, which measured the intensity, and onto a screen. The beam size was measured by digitizing the signal from a TV image of the screen. The emittance value was extracted from a plot of the variation of the beam size with the strength of focusing quadrupoles upstream of the screen.

7. NPAS - NUCLEAR PHYSICS AT SLAC

As a result of a proposal by The American University, the U.S. Department of Energy has approved a new 1.65 million dollar injector at SLAC for a program of nuclear-structure physics. The new injector will feed electrons into the last 20% of the linear accelerator to produce beams of 0.5 to 6 GeV. The beam intensity will be a factor of 10 higher than presently available from the full linac at that energy due to the reduced effects of beam breakup in the shorter length.

This high-intensity and low-duty cycle region is not covered by the medium energy electron facilities around the world or by the high-energy beams at SLAC. This facility will be ideal for experiments in electron scattering from nuclear targets in the transition region between traditional low-energy nuclear structure and the high-energy region dominated by quark effects.

Construction began October 1, 1983, and beam is expected by January 1985. There will be funds beginning in FY 1985 for a program of nuclear structure experiments, to be called NPAS (Nuclear Physics at SLAC). The deadline for the first round of proposals is April 20, 1984. The program will use existing spectrometers and facilities of End Station A at SLAC, concentrating on elastic and inelastic scattering from light nuclei. A polarized electron source could be added in the future to include spin transfer and parity violating measurements. An amount of money, yet to be determined, will be added each year to the SLAC budget by DoE within the U.S. nuclear physics program for NPAS. The integrated running time will be from one to two months per year, depending on the SLAC schedule and on the cost for setup and operation of the approved experiments. The present plan calls for operation of the new injector beams in a dedicated mode during the summer shutdowns of the high energy program.

The nuclear program will be administered by SLAC. A new Nuclear Program Advisory Committee (NPAC) has been formed. The NPAC will be responsible for program decisions on the basis of physics merit of the competing proposals, including proposals for which the injector was funded. The NPAC chairman will advise the SLAC Associate Director of the Research Division, Richard Taylor, of the committee decisions. The Associate Director will have final power of approval. SLAC Director, W. K. H. Panofsky, has asked Ray Arnold of The American University to act as Technical Coordinator to oversee the injector construction and manage the nuclear program.

Nuclear Program Advisory Committee

Erich Vogt, Chairman	TRIUMF
Joseph Cerny	LBL
Roy Holt	ARGONNE
William Turchinetz	MIT
Hobey DeStaebler	SLAC
James McCarthy	U. OF VIRGINIA
Dirk Walecka	STANFORD

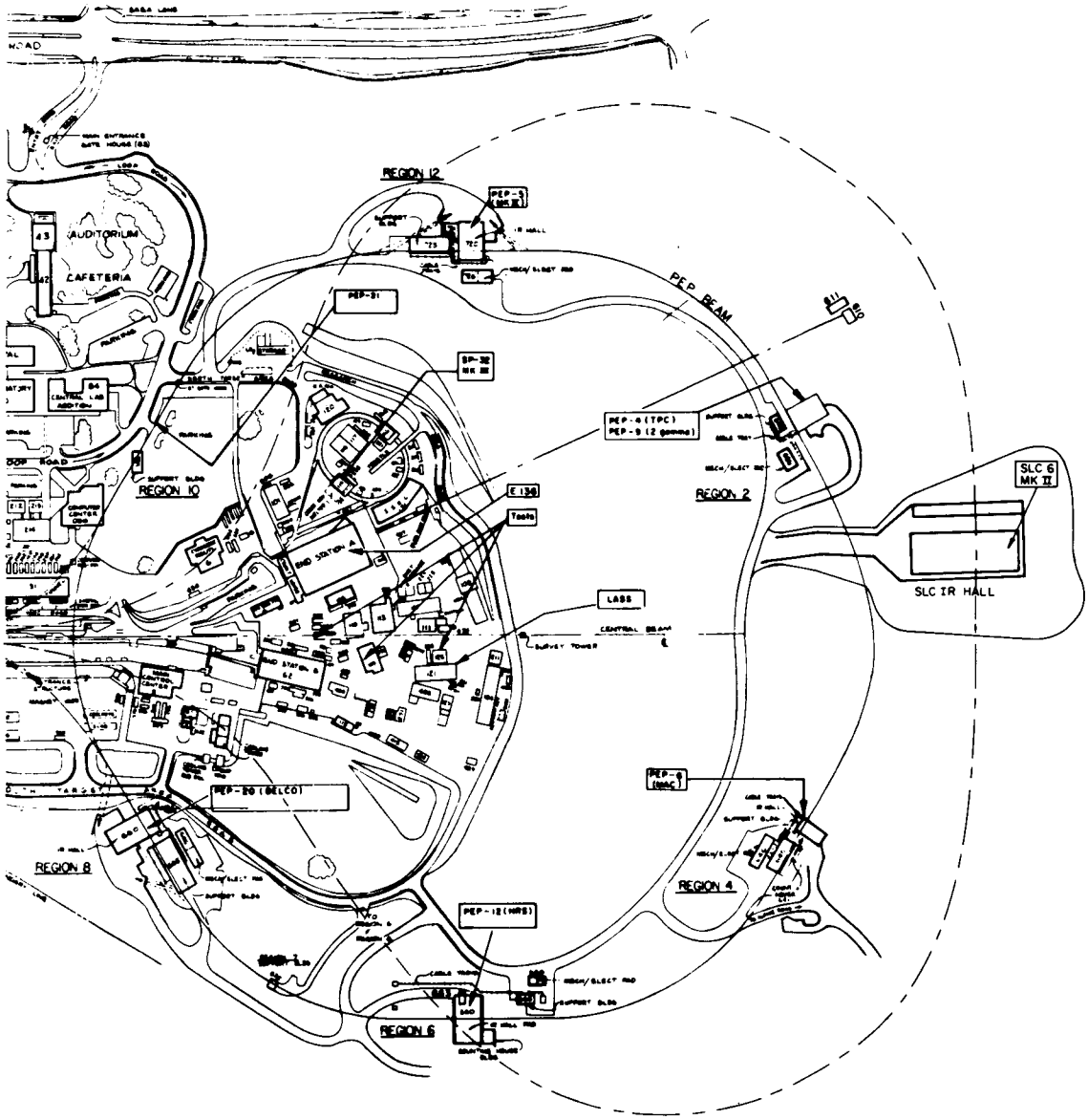
REGION 12
AUDITORIUM
CAFETERIA
PEP BEAM
REGION 10
REGION 2
SLC 6
MK II
SLC IR HALL
LASS
REGION 8
REGION 4
REGION 6

FIG 1

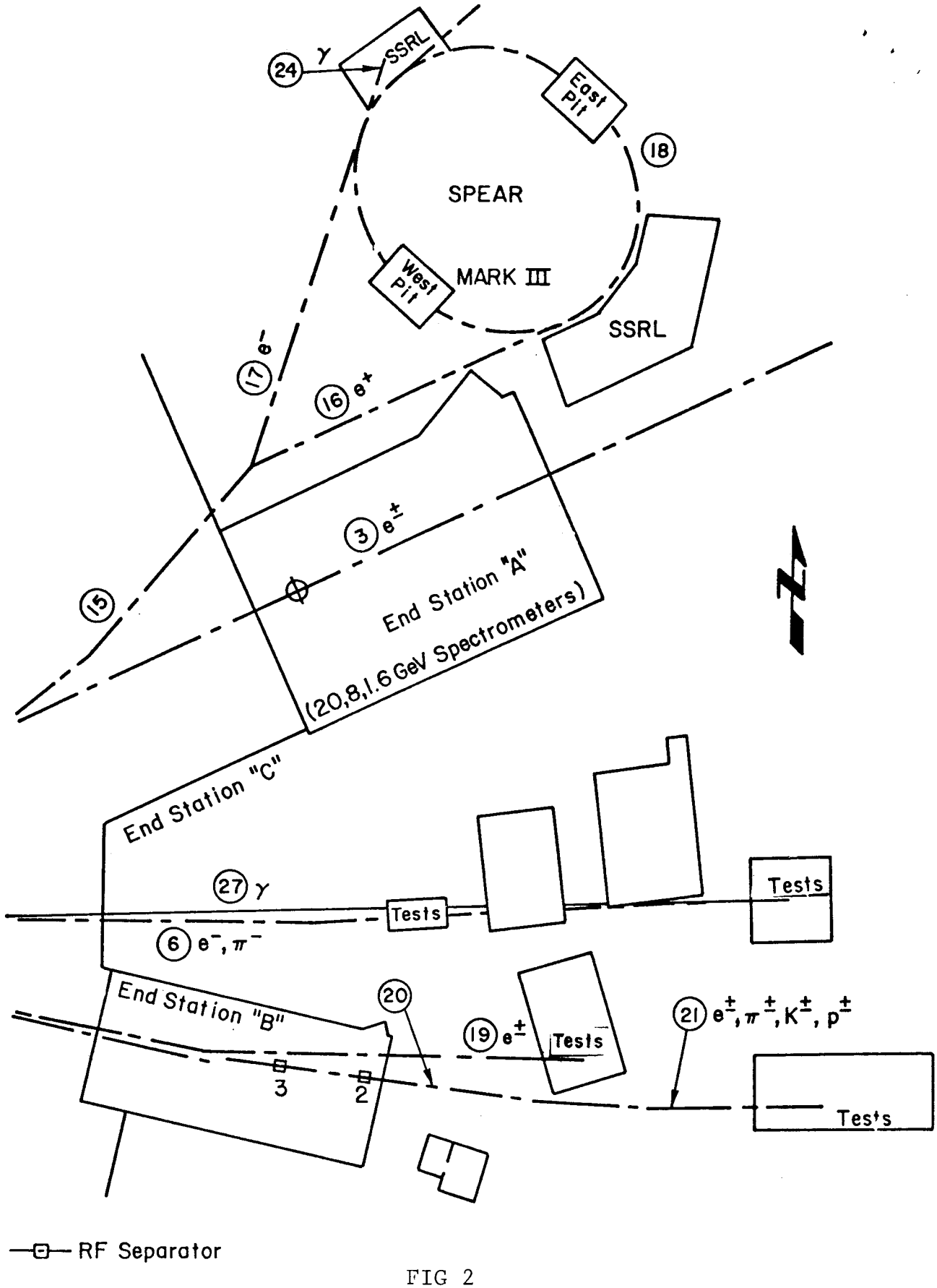
24 γ
SSRL
East Pit
18
SPEAR
West Pit
MARK III
SSRL
17 e⁻
16 e⁺
3 e±
15
End Station "A"
(20,8,1.6 GeV Spectrometers)
End Station "C"
27 γ
Tests
Tests
6 e⁻, π⁻
End Station "B"
20
19 e±
Tests
21 e±, π±, K±, p±
3
2
Tests
RF Separator

FIG 2

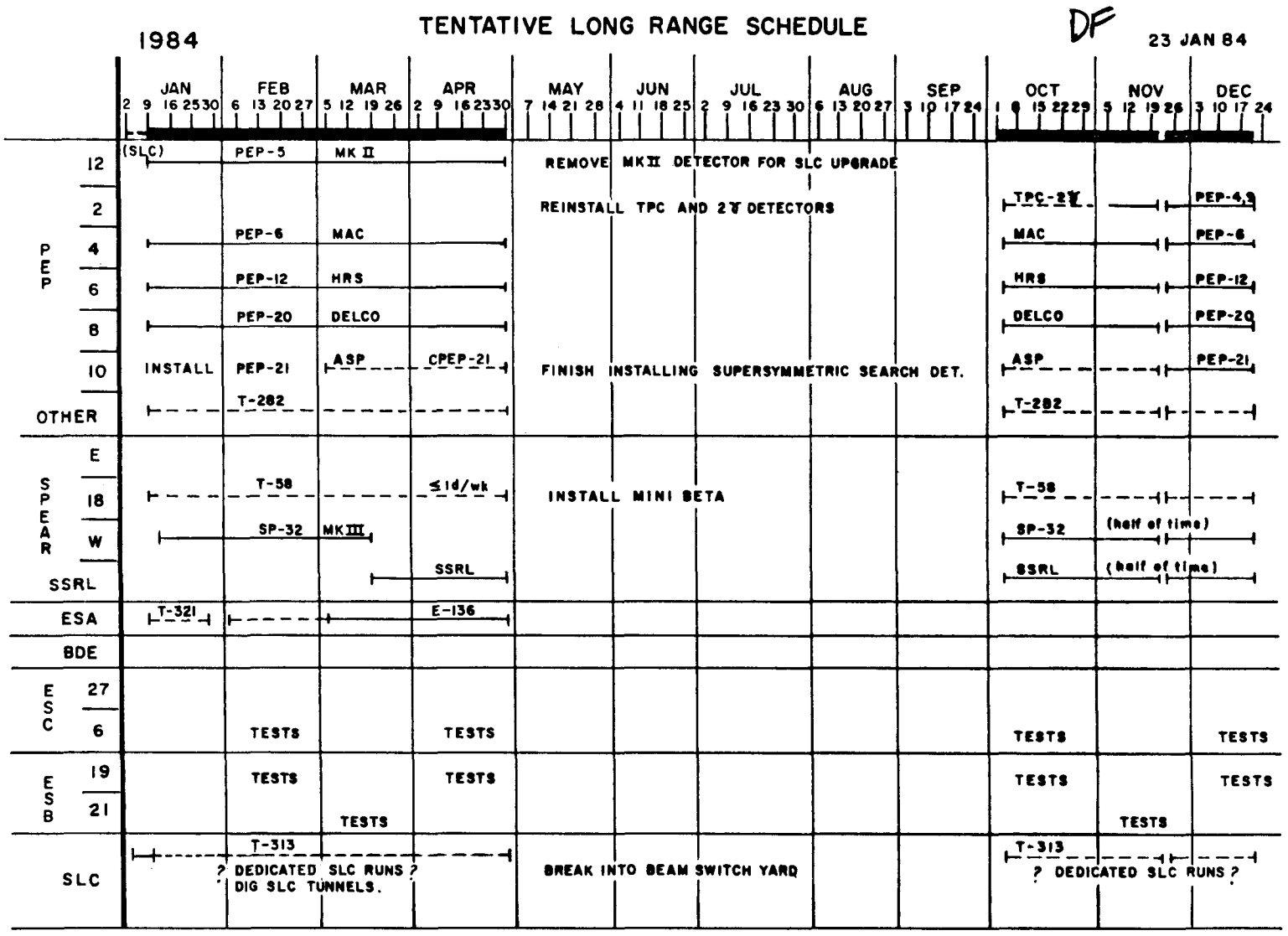
TENTATIVE LONG RANGE SCHEDULE
1984
DF
23 JAN 84
JAN 2 9 16 25 30
FEB 6 13 20 27
MAR 5 12 19 26
APR 2 9 16 23 30
MAY 7 14 21 28
JUN 4 11 18 25
JUL 2 9 16 23 30
AUG 6 13 20 27
SEP 3 10 17 24
OCT 1 8 15 22 29
NOV 5 12 19 26
DEC 3 10 17 24
PEP 12
(SLC)
PEP-5
MK II
REMOVE MKII DETECTOR FOR SLC UPGRADE
2
REINSTALL TPC AND 2γ DETECTORS
TPC-2γ
PEP-4,9
4
PEP-6
MAC
MAC
PEP-6
6
PEP-12
HRS
HRS
PEP-12
8
PEP-20
DELCO
DELCO
PEP-20
10
INSTALL
PEP-21
ASP
CPEP-21
FINISH INSTALLING SUPERSYMMETRIC SEARCH DET.
ASP
PEP-21
OTHER
T-282
T-282
SPEAR E
18
T-58
≤1d/wk
INSTALL MINI BETA
T-58
W
SP-32
MKIII
SP-32
(half of time)
SSRL
SSRL
SSRL
(half of time)
ESA
T-321
E-136
BDE
ESC 27
6
TESTS
TESTS
TESTS
TESTS
ESB 19
21
TESTS
TESTS
TESTS
TESTS
TESTS
SLC
T-313
? DEDICATED SLC RUNS ?
DIG SLC TUNNELS.
BREAK INTO BEAM SWITCH YARD
T-313
? DEDICATED SLC RUNS ?

FIG 3

STANFORD LINEAR ACCELERATOR CENTER

TABLE 1

December, 1983

TABLE OF APPROVED EXPERIMENTS

Number	Title	Experimenters	Date Approved Stage 1	Stage 2	Status
E-136	Elastic Electron-Proton Cross Sections at High Momentum Transfer	AMERICAN U.: R. ARNOLD, P.Bosted, S. Rock, Z.M. Szalata U. BONN: B. A. Mecking SLAC: D. J. Sherden	5/16/81		Inactive
BC-75	Charm Study in SLAC Hybrid Facility	RUTHERFORD LAB: G. KALMUS IMPERIAL COLL., U.BIRMINGHAM, UCB, SLAC, TOHOKU, TECHNION-ISRAEL, U.TEL-AVIV, WEIZMANN INST., M.I.T., BROWN U., ORNL, U. TENNESSEE, TUFTS U., SLAC: K.MOFFEIT	11/6/82		Running/Comp.
SP-32	Studies of the Weak Decays of D Mesons at the ψ'' Resonance	C.I.T.: R.Baltrusaitis, J.Hauser, D. HITLIN, J.Richman, J.J.Russell SLAC: K.Bunnell, D.Coward, K.Einsweiler, D.Hutchinson, R.Mozley, A.Odian, J.Roehrig, W.Toki, Y. Unno, F. Villa UCSC: H.Bledsoe, D.Dorfan, R.Fabrizio, F.Grancagnolo, R.Hamilton, C.Heusch, T.Schalk, H.Sadrozinski, A. Seiden, D. Smith U. ILLINOIS: J.Becker, R.Cassell, H.Cui, B.Eisenstein, G.Gladding, S.Plaetzer, A.Spadafora, J.Thaler, A.Wattenberg, W.Wisniewski U. WASH.: J.Brown, T.Burnett, V.Cook, C.delPapa, H.Lubatti, K.Moriyasu, J.Rothberg, J.Sleeman, H. Willutski, D. Wisinski	5/16/81		Ready to Run

Number	Title	Experimenters	Date Approved	Status
PEP-4 (TPC)	A PEP Facility Based on the Time Projection Chamber	LBL: M.Alston-Garnjost, A.Barbaro-Galtieri, A.Barnes, A.Bross, W.C. Carithers, O.Chamberlain, A.Clark, O.Dahl, C.Day, P.Eberhard, D.Fancher, R.Kenney, L.Kerth, S.Loken, G.Lynch, R.Madaras, R.Majka, P.Martin, J.Marx, P.Nemethy, D.Nygren, P.Oddone, M.Pripstein, P.Robrish, M.Ronan, R. Ross, G.Shapiro, M.Stevenson, W.Wenzel UCLA: C.Buchanan, J.Hauptman, D.Stork, W.Slater, H.Ticho YALE: M.Zeller UCR: W.Gorn, J. Layter, B. SHEN,G.VanDalen JOHNS-HOPKINS: B. Barnett B.Blumenfeld, C.-Y.Chien, L.Madansky, J. Matthews, A. Pevsner U. TOKYO: J.Chiba, H.Fujii, T. Fujii,T.Kamae	21 Jan. 1977	Upgrading
PEP-5 (MK II)	General Survey of Particle Production at PEP	SLAC: A.Boyarski,M.Breidenbach,D.Burke B.Delcourt, J. Dorenbosch,J.Dorfan, G.Feldman, G.Hanson, R. Hollebeek,W.Innes, J.Jaros, R.R.Larsen,B.Loehr,N. LOCKYER, V. Luth, M.Perl, B.Richter,A. Roussarie, D.Scharre, J.Siegrist,R.Vidal, J. Weiss LBL: G.Abrams,A.Blondel,W.Chinowsky, G.Gidal,G.Goldhaber, A.Johnson, J. Kadyk,A.Lankford,J.Strait, G.Trilling, I.Videau,Y.Wang,G.Zhao HARVARD: A.Baecker,C.Blocker, R. Schwitters	1/21/77	Running
PEP-6 (MAC)	A Lepton Total Energy Detector	U.COLORADO: W. Ford,J. Smith U.WISCONSIN:J.Johnson,R. Morse, R.Prepost, D. Wiser SLAC: W. Ash,G.Chadwick, P.Leung, S.Michalowski, D. Ritson U.UTAH: D.Groom, E. Loh NORTHEASTERN U; L.Baksay,H.Band,W.Faissler, M.Gettner,B.Gottschalk,J.Morimisato, D.Shambroom,E.VonGoeler,R. WEINSTEIN	1/21/77	Running

Number	Title	Experimenters	Date Approved	Status
PEP-9 (2-Gamma)	PEP Forward Detector Facility	UCD: W. Ko, R.LANDER, D.Pellett, C. Williams UCSD: G.Masek, E.Miller, W.Vernon UCSB: V.Bharadwat, D.Caldwell,A.Eisner, A.Lu, R. Morrison, S. Yellin NIKHEF: J.Armitage, F.Erne, W.Lange-feld, H.Paar, H.Sens, J.Timmer	21 Jan. 1977	Inactive/ Upgrading
PEP-12 (HRS)	High Resolution Spectrometer	ANL: M.DERRICK,E.Fernandez, L.Hyman, R.Klem, P.Kooijman, S.Kooijman,J.Loos, L.Price INDIANA U.: G.Baranko, B.Brabson, G.Forden, S.Gray, J.-P.Guillaud, D.Koltick, H.Neal, H. Ogren, D. Rust U. MICHIGAN: C.Akerlof, J.Chapman, N.Harnew, D. MEYER, D.Nitz, D.Rubin, A.Seidl, R.Thun PURDUE: R.DeBonte,R.Jones, F.Loeffler, R. McIlwain, D.Miller, P.Ong, L.K.Rangan, E. Shibata, R.Stevens, B.Wilson, D.Wood LBL: B. Cork SLAC: L. Keller, J. Va'vra	29 Jan. 1978	Running
PEP-20	DELCO at PEP	CIT: B.Barish, S.-C. Gao,Y.-Z. Huang D.Koop, J.Ludwig, G.Mills, S.Sherman, R. Stroynowski, H. Yamamoto, SLAC: W.Atwood,P.Baillon,H.DeStaebler, H.Kichimi, A. Ogawa,D.Perret-Gallix, R.Pitthan, C.Prescott,L.Rochester, R. Taylor, S.-Q.Wang,C.Young STANFORD U: G./Bonneaud,G.Donaldson, M.Duro, G.Irwin, J.KIRKBY,D. Pollard, S. Wojcicki, W.-G. Yan	9/8/78	Running
PEP-21	Search for Unseen States Using Photon Tagging	SLAC:D.BURKE,R.HOLLEBEEK,M.Jonker MIT: S. Whitaker U.WASH: R.Davisson,J.Rothberg,K.Young SUNY-STONY BROOK: P.Grannis	5/14/83	Planning/Setup
SLC-6	MARK II at the SLC	SLAC: D.DORFAN, G.FELDMAN U. MICHIGAN LBL: G. TRILLING C.I.T.,UC-SantaCruz,U.Hawaii	5/14/83	Planning

December, 1983 Table of Approved Experiments (continued) - 4

Number	Title	Experimenters		Date Approved	Status
D-24	SSRL Dedicated Time	SLAC/SSRL:	H. Winick	12/04/75	Planning
D-28	Resonance Radiation	STANFORD:	M. Piestrup	9/19/80	Planning
D-30	Channeling Radiation	SUNY-ALBANY	C.R. Sun	10/8/82	Planning
P-0	Operator Training	SLAC:	D. Tsang		Planning
P-1	Beam Dynamics Tests for the SLC	SLAC:	G.Loew, R.Miller,R.Stiening		Inactive
P-6	General Equipment Checkout	SLAC:	G. Loew		Test
P-7	Positron Source Tuneup	SLAC:	G. Loew,R.Miller	10/01/71	Test
P-9	SPEAR Tuning Test	SLAC:	G. Loew		Test
T-58	SPEAR Electron Storage Ring Tests	SLAC:	B.Richter, J.Rees, J.Harris	11/21/71	Running
T-172	Beam Line 6 Checkout	SLAC:	R. Gearhart	10/24/74	Inactive
T-276	Beam Line 27	SLAC:	J. Murray/K. Moffeit	11/15/79	Inactive
T-282	PEP Accelerator Studies	SLAC:	E. Paterson	1/18/80	Planning
T-296	19 Line Setup and Checkout	SLAC:	T. Fieguth	10/22/80	Inactive
T-298	PEP-12 Wire Calorimeter Test	ANL:	L. Price	10/27/80	Inactive
T-300	Cerenkov Ring Imaging Detector	SLAC:	S. Williams	1/13/81	Running

December, 1983 Table of Approved Experiments (continued) - 5

Number	Title	Experimenters		Date Approved	Status
T-313	SLC Damping Ring Checkout	SLAC:	S. Ecklund	12/22/81	Running
T-319	CCD Development	SLAC:	S. Shapiro	4/16/82	Running
T-321	Section 10 Profile Monitors	SLAC:	V. Luth	5/10/82	Planning
T-328	Test of Cerenkov Counters for Identification	U. WASH.	V. Chaloupka	12/21/82	Inactive
T-338	MARK II/SLC Drift Chamber	SLAC:	A. Boyarski	5/19/83	Planning
T-343	BGO Calorimeter Test	NIKHEF:	J. C. Sens	9/12/83	Planning
T-344	Test of Lead Glass	KEK: SLAC:	K. Ogawa R. Gearhart	9/26/83	Planning
T-345	Test Background Rates in ESA	AMERICAN U.	R. Arnold	11/7/83	Running/Comp.
T-346	Test B/L 20/21 at Low Momenta	SLAC:	R. Gearhart S. Shapiro	11/9/83	Planning
T-348	SLD Drift Chamber Tests	SLAC:	C. Prescott	11/29/83	Planning
T-349	SLC Calorimeter Tests	U. WASH. U. WISC.	P. Mockett J. Johnson	11/17/83	Planning
T-351	Energy Calibration for E-137	VPI:	L. Mo	12/16/83	Construction

STATUS:
Running = Experiment is in data collection phase and was a prime user of accelerator time.
Checkout = Experiment is in checkout phase and used accelerator time for checkout purposes.
Setup = Experiment was being setup in the research yard, or PEP I.R.
Inactive = Experiment was inactive in the research yard.
Construction = Experiment and/or beam is under construction.
Ready to Run = Experiment ready for future scheduled run.
Parasiting = Used parasite beam time.
Complete = Experiment completed.
Test = Test run performed.
Planning = In design & planning stage.
Upgrading = Experimental equipment is being upgraded.
Repair = Down for Equipment Repair

STANFORD LINEAR ACCELERATOR CENTER

10. Accelerator and Research Operations

August - December 1983

A. OPERATING HOURS (Manned Hours)

Physics Beam Hours[1]	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTAL
Machine and Particle Physics	240	363	649	626	499	2,377
Scheduled Downtime	0	0	9	72	8	89
Unscheduled Downtime	112	117	87	22	21	359
TOTAL OPERATING HOURS	352	480	745	720	528	2,825

B. EXPERIMENTAL HOURS[2]

1. Particle Physics

EXPERIMENTAL AREA OR BEAMLINE (3)	EXPERIMENTAL TIME (Actual Hours)	TEST AND CHECKOUT HOURS	TOTAL EXPERIMENT HOURS
PEP			
IR-2			
IR-4	880		880
IR-6	380		380
IR-8	880		880
IR-10			
IR-12	880		880
SPEAR			
EAST PIT			
WEST PIT	240		240
ESA 3		8	8
ESB 19		330	330
20/21		113	113
14			
8			
ESC 27	892	294	1186
26/6		18	18
TOTAL	4152	763	4915

2. Machine Physics

PEP 374 , SPEAR 581 , LINAC 1637 2592

3. SSRL (Dedicated Time at SPEAR)[4] 915

TOTAL EXPERIMENTAL HOURS 8422

(1) Number of hours accelerator is run with one or more beams excluding accelerator beam tune-up and other non-physics beam time.

(2) Number of hours an experiment is run including actual beam hours and beam downtime "normal to the experiment."

(3) Refer to Figures 1 and 2 for beam line locations and experimental areas.

(4) Accelerator Beam available to SPEAR storage ring.

C. OVERALL EXPERIMENTAL PROGRAM STATUS

1. Electronic Experiments

	Factored Hrs.[1/]
Approved research hours at beginning of period	256
Hours run during the period	---
New Hours approved during the period	---
Approved hours remaining at end of period	256

2. PEP and SPEAR Experiments

	Actual Hrs. PEP	Actual Hrs. SPEAR
Approved research hours at beginning of period	---	2367
Hours run during the period	3020	240
New hours approved during the period	---	---
Approved hours remaining at end of period	---	2127

3. Bubble Chamber Experiments

	40" BC Hours	40" BC Pictures
Approved research hours at beginning of period	2904	1412K
Hours run during the period	1186	742K
New hours approved during the period	219	97K
Approved hours remaining at the end of period	1937	767K

[1/] Factored hours are represented by the formula $T_c = T_o (R + 20)/200$ where T_c = charged hours, T_o = total hours beam was available to the experimenter for both checkout and data taking, and R = the average pulse repetition rate. Maximum for $(R + 20)/200$ is 1.5 even if the calculated amount exceeds this value.

SLAC's Scientific Policy Committee

The interests of SLAC's User community are represented by the SLAC Scientific Policy Committee, which meets several times a year to review SLAC's program and policies, its relationship with Users, and the like. Users and prospective Users of the SLAC facility are invited to address any problems or suggestions they may have to any of the members of the SPC. The present membership of the SPC is given below.

Term expires June 30, 1984

E. Goldwasser	(Chairman)	U. Illinois	D. Jackson	LBL-UCB
J. Bjorken		Fermilab	U. Nauenberg	U. Colorado
C.-Y. Chien		John Hopkins U.	R. Prepost	U. Wisconsin
B. Gittelman		Cornell U.		

Term expires June 30, 1986

C. Baltay	Columbia U.	E. Picasso	CERN
C. Buchanan	UCLA	P. Reardon	Princeton U.
C. Callan	Princeton U.	A. Stewart-Smith	Princeton U.
D. Nygren	LBL-UCB	H. Ticho	UCLA

SLAC's Experimental Program Advisory Committee

The Experimental Program Advisory Committee (EPAC) consists of twelve members and advises the Director of SLAC in establishing the program commitments for the accelerator and experimental facilities. Meetings are scheduled as often as necessary, but no less than twice a year. All new proposals submitted to the EPAC two months before a given EPAC meeting will be considered at that meeting.

Proposals for experiments at SLAC should be sent to the EPAC Secretary, David Fryberger, SLAC, Bin 20. For details of proposal preparation and submittal, please refer to the SLAC Users Handbook.

Term Expires 1984

Karl Berkelman	Cornell University	Gerald Smith	Pennsylvania State Univ.
William Carithers	Lawrence Berkeley Lab	Richard Taylor	SLAC
Michel Davier	Orsay	Albert Wattenberg	University of Illinois
Paul Grannis	SUNY-Stony Brook	Sau Lan Wu	U. Wisconsin and DESY
Helen Quinn	SLAC		

Term Expires 1985

Robert Jaffe	M.I.T.	Melvyn Shochet	University of Chicago
Robert Sugar	U.C.-Santa Barbara	Gunther Wolf	DESY

SLAC USERS BULLETIN
(C/O EFD, Bin 20)
*Stanford Linear Accelerator Center**
Stanford University - Stanford, California - 94305
Editors: Lewis P. Keller - Dorothy Edminster

*Operated by Stanford University under contract with the U. S. Department of Energy

FROM:

SLAC - BIN 20
P.O. BOX 4349
STANFORD, CA 94305

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