HOTLINE

PRINCETON PLASMA PHYSICS LABORATORY

Vol. 1, No. 2 January 15, 1980

Tokamak Fusion Program in China

On December 5th, Drs. Chen Chuen Hsian, Yan Lu-Guang, and Shan Zhi-Lin of the Academia Sinica in the People's Republic of China presented a colloquium on plans for the construction of the largest tokamak in their country. Located at the newly created Institute of Plasma Physics in Hefei (about 250 miles west of Shanghai), An-hui Province, the CT-8 tokamak will have a major radius of 1.86 m and a minor radius of 0.7 m. The device will be constructed with its poloidal field coils outside the D-shaped toroidal field coils. Three stages of operation are planned. During the first stage, toroidal magnetic field strength will reach about 1.5 TL, and plasma current will be about 300 to 400 kA. The first stage will center on studies of a plasma having a large minor radius, impurity control, heating experiments, and equilibrium and stability studies. If neutral beam power is available during this stage, high beta experiments are anticipated. During the second stage, toroidal magnetic field strength will be about 2.5 to 3 TL, with plasma current about 1 to 1.3 MA. The addition of 2 to 5 MW of neutral beam power is expected during the second stage. Plans for third stage operation call for an upgrade of CT-8 parameters based on the device's performance. In addition to the neutral beam studies, scientists at the Institute are planning to experiment with lower hybrid resonance heating (LHRH), ion cyclotron resonance heating (ICRH) and electron cyclotron resonance heating (ECRH). Chinese scientists anticipate the ion temperatures on CT-8 to be about 4-5 keV; densities of about 5×10^{13} cm^{-3} or greater and confinement times of about 200 ms are also expected.

Dr. Chen indicated that the CT-8 data acquisition systems will be primitive compared to those in the U.S. The project will use two computers, each about the size of a PDP-11. Diagnostics will also be less sophisticated than those used in the U.S. programs. Because tokamak development is relatively new in China (discussion of a program began there in 1970), a sizable portion of the project personnel will be drawn from areas other than plasma physics, and will include about 40 scientists and 80 engineers out of a project staff of 400.

Construction of the supporting work for the CT-8 tokamak was begun last year; a first plasma is still four to five years in the future. According to Dr. Chen, obtaining a reliable grid power supply will be a major difficulty. Other problem areas will be procuring components from contractors and construction of the neutral beam systems.

Fusion Technology Symposia

The second and third symposia in the fusion technology series for professional technical and technical associate staffs are scheduled for this month. On Tuesday, January 15th at 4:00 p.m. Dr. H.O. Wuster, Project Manager of the Joint European Tokamak (JET) will speak on the status of that program. On Thursday, January 17th at 2:00 p.m. a status report on the STARFIRE commercial tokamak reactor study will be presented by Dr. Charles C. Baker, Director of the Fusion Power Program, Argonne National Laboratory. Both presentations will be in Sayre Hall auditorium.

Energy Contest

The University is sponsoring four Energy Conservation Suggestion Contests throughout the year; the first one started December 6th. Prizes of $100, $75 and $50 savings bonds are being offered for

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Energy Contest *cont. from pg. 1*

original energy conservation ideas that might help the University save energy and money. PPL is participating in the contest, and all employees are eligible. Any ideas specific to PPL or adopted by the Laboratory will be considered for separate PPL prizes. Additional information and entry forms can be obtained by telephoning the Energy Hotline at 7-2-HELP.

New Publication

PPL Communications Office has issued a new information bulletin entitled *Fusion Power.* This publication, written for a non-technical audience, describes basic fusion reactions, the conditions necessary for fusion to occur, tokamak plasma confinement, and plasma heating. Copies may be obtained from Mary Bersch, ext. 2750.

Airport Transportation

Because of the pending gasoline shortage at PPL, Robert D. Smart, Acting Associate Head of Administration Department, has passed along the following information about public transportation serving the area's major airports.

Philadelphia Airport can be reached by taking the train from Princeton Junction to Philadelphia's 30th Street Station and a regularly scheduled shuttle bus from 30th Street to the Airport. Mercer County (Trenton) Airport has scheduled flights to Philadelphia at add-on fares of about $10.

Newark Airport can be reached by taking the train from Princeton Junction to Newark, and then a shuttle bus to the airport. Shuttles leave Newark Station about every 20 minutes. Princeton Airways provides 15 daily round trips from Princeton Airport to Newark Airport on weekdays and three trips on Sundays. There is no service on Saturdays. The add-on fare is $6.50 and up; flight time is about 20 minutes. Schedules may be erratic and overbooking is common.

The Salem Airport Limousine offers six trips a day from the Nassau Inn to Newark Airport at about $10 each way. Travel time is about one and a half hours. JFK Airport is also serviced by Salem Limousine, which departs 2:00 P.M. every day from the Nassau Inn, with arrival at JFK between 4:00 and 4:30. One-way fare is $17.

Taxis and rental cars are available from Newark and Philadelphia. Typical fares are about $55 for taxis and $45 for a rental car.

If public transportation cannot be used, PPL Motor Pool can provide service only if gasoline is available and a driver and vehicle can be scheduled.

Maternity Benefits

Changes in PPL Blue Cross/Blue Shield coverage have been made to comply with new federal mandates. Under the basic benefit program, the maternity waiting period has been eliminated. In addition, the number of Blue Cross benefit days is now the same for pregnancy as for other general health conditions. Under Rider J, benefits are provided for pregnancy-related X-ray and lab services. The exclusion for pregnancy-related expenses has been eliminated from the major medical program; these expenses are now included under covered medical expenses. These changes are effective as of April 29, 1979. Services for any condition related to the pregnancy of a child dependent are not covered.

For Sale

ROLEX 18-k gold day-date chronometer. Rolex guarantee --- $2400 --- (33% discount). Telephone: 683-2410; 799-3378.

Studded Snow Tires H78-14 white walls --- $50 for the pair. Telephone: 683-2757.

Electric Ceramic Kiln --- fires to 1900^{o}, 120V. Firing chamber --- 11"x11"x10" high; glazes, slip, clay included. $60. Call 683-2752 or 921-2533.

The PPL Hotline is issued by the Princeton University Plasma Physics Laboratory, a research facility supported by the U.S. Department of Energy. Correspondence should be directed to PPL Communications Office, Aero Lab, James Forrestal Campus.

ACT–1 Goes On Line

On Friday, August 10, about 100 PPL staff members gathered on the second floor of L-wing at C-Site to celebrate the accomplishment of first plasma on a new PPL small research device called ACT-1 (Advanced Concepts Torus-1). The gathering marked the end of a 2-year effort to design and construct the new machine that now occupies the space of the old L-4 linear device.

ACT-1 is equipped with the ability to generate plasmas using various techniques including electron and ion cyclotron waves, whistler waves, and a tungsten filament discharge. The machine will produce a doughnut-shaped plasma with a major diameter of 118 cm and a minor diameter of 20 cm.

ACT-1 utilizes an aluminum doughnut-shaped vacuum vessel, comprised of 26 identical toroidal-section chambers with large ports offering enormous experimental access to the plasma. The vacuum chamber is water-cooled.

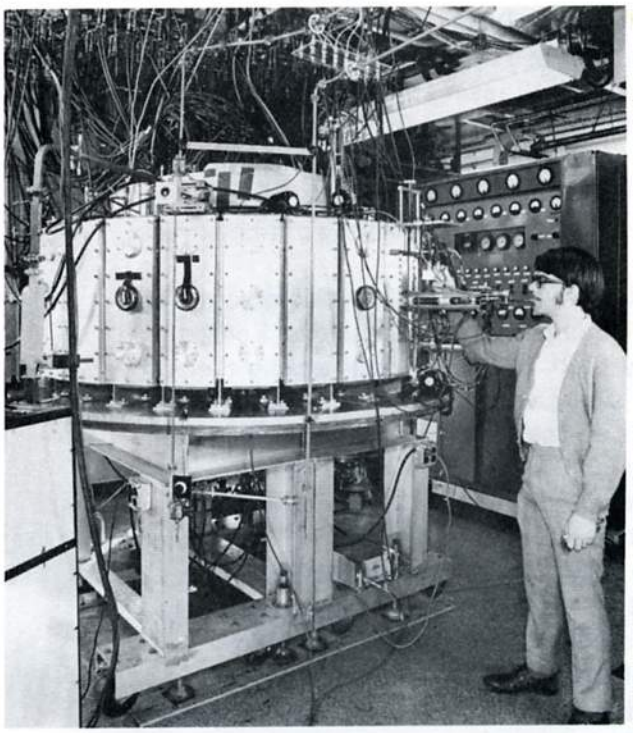
Although ACT-1 has a doughnut-shaped geometry it is not a tokamak. During its initial phase of operation, ACT-1 will use a vertical plasma current to maintain plasma equilibrium. Tokamaks employ a horizontal current, i.e. one flowing around the long way within the plasma doughnut. ACT-1 will produce steady-state rather than the pulsed plasmas of tokamak devices.

The absence of a horizontally directed (toroidal) plasma current will more readily enable physicists to study plasma currents induced by radio-frequency waves. This work is important in that it could lead to the steady-state operation of a tokamak, which would be advantageous in a fusion power plant.

During the first phase of operation, ACT-1 will also be used for studies of the physical phenomena associated with the various forms of radio-frequency heating, including ion cyclotron resonance and lower hybrid heating.

After about one year of operation in the steady-state mode, ACT-1 will be converted to a tokamak with the addition of a ferrite core.

Al Drake joined the Laboratory on October 1, 1979 to assume the position of Senior Personnel Recruiter. His experience includes extensive work in recruiting and Equal Employment Opportunity (EEO). Al was previously with the Allstates Engineering Company in Trenton as a Senior Personnel Administrator.



Graduate student Randy Wilson adjusts limit positions on diagnostic equipment on the ACT-1 device.

Since September

Since the last issue of the *PPL News,* a number of notable events occurred here at the Laboratory.

Credit Union Changes. Beginning October 2, 1979 the Princeton University Employees' Federal Credit Union began paying dividends on members' savings from day of deposit to day of withdrawal. Dividends are computed monthly and credited to accounts quarterly. The current annual interest rate is 7%.

Safety Seminars for technical shop personnel were conducted by the Employee Relations section of the Personnel department from September through November at the Vacuum Shop, Coil Shop and RF section. The series will continue until all sections have been reached.

PPL Women's Bowling League got underway in September. Alleycats, Bouncers, Checkmates and Guttersnipes are the teams that play at Colonial Lanes in Lawrenceville every Wednesday evening. Millie Willerton of the PDX office at C-Site organized the league and serves as Secretary/Treasurer. All PPL women interested in bowling as substitutes should contact Millie on ext. 3100.

Vacuum Shop Team won the Forrestal Softball League championship in September by defeating the RF team 15 to 12. RF had edged out PDX to get to the finals. Other teams representing Coil Shop, Storekeepers, Technical Shop and Maintenance rounded out the league. Vacuum Shop retains the trophy until next year.

Princeton University Golf League closed the season in October with a banquet at Forsgate Country Club. PPL employees among the season divisional winners were Clarence Bosley, Division B, and William Ernst and Richard Shamon in Division D. Among the playoff champions was Robert Mosley, who, with his teammate, captured first place in the championship flight. Other winners at PPL were Michael Knorr, Henry Bornkamp, Roger Gould, Robert Connolly, Nan Jones, Don Grove and Joseph Perron.
Newly elected officers are Nan Jones, President; Frank Bennett, Secretary; and John Tarnecki, Treasurer. Next season's play starts in May.

Vacuum shop safety seminar. The speaker is Harry Howe, Jr.; from his left are: William Walker, Joseph Smolinski, Sylvester Vinson, Joseph Bottinelli, Bob Delaney, William Zimmer, John Dolobacs, Fred Simmons, Jr., Tom Ellis, John Swatkoski, and Howard Henry.

Vacuum Shop Team. Pictured l. to r., first row: Bubba Vinson, Team Manager, Red Delaney; second row: Walt Ringle, John Wheeler, Dave Mullaney, Charlie Harrison, John Swatkoski, John Dolobacs, Abe Simon; third row: Joe Smolinski, Bob Walls, Mike Mozeleski, Bill Walker, Dan Kungl, Herb Puckett; not pictured: Chuck Johnson.

Use Of Government-Owned Vehicles

The Department of Energy (DOE) has issued a memo concerning misuse of government-owned vehicles. Although no specific problems at PPL were noted, we are reminded of the following restrictions: vehicles are to be used for official business only, and no friends or relatives may accompany a DOE or contractor employee, even if the employee is engaged in official business. The 55 miles-per-hour speed limit is not to be exceeded.

Drivers are reminded that courteous and safe operation of these vehicles is essential. Questions concerning vehicle use should be directed to the Transportation Services office, ext. 3108.

Major Medical Benefits

Because of an increase in the number of Major Medical benefits applications being filed, the PPL personnel department requests that these procedures be followed in filing claims:

Anyone with an open claim should delay submitting Major Medical bills until covered charges of at least $50 have been incurred.

Employees should not hold their covered bills longer than three or four months.

The employee section of the new application should be completed in its entirety.

Bills should be sorted by type (MD, drug, etc.), and each type of charge should be submitted in chronological order with the oldest bill on top and the newest on the bottom. Each should show the patient's name and the date and type of service or purchase.

Medicare statements should be attached to the appropriate bills.

Base Plan statements should be attached to the appropriate physician or laboratory bills.

Following these procedures should help expedite processing of applications. Anyone unsure of how to proceed is encouraged to contact Eleanor Schmitt at the PPL personnel department before filing a claim.

C-Site Construction

PPL employees are reminded that construction sites are off-limits to unauthorized staff because of safety considerations and to prevent interference with construction operations. Staff members requiring access for business purposes may contact the Administration Office (AD-3; ext. 2652) for approval and hard hats. *Hotline* will endeavor to keep you posted on construction progress.

TFTR Group Moves

TFTR *Central Instrumentation Control and Data Acquisition (CICADA)* group became the first PPL employees to occupy their new offices in the East wing of the new lab/office building. In the next few weeks, the TFTR diagnostics group and TFTR headquarters will also make the move.

Telephone Paging System

A Modax telephone dial interconnect paging system has been installed at PPL. This system enables a voice message to be sent by telephone directly to any PPL pocket radio pager. Operator assistance is no longer required. A directory of paging numbers and further information on this system is available from Mr. McBride, Telephone Manager (ext. 2694).

PPL Hotline thanks Sylvester Vinson and Muriel Strohl for articles submitted for this issue.

The PPL **Holiday Dinner Dance** will be held on Thursday evening, December 20th, at Cedar Gardens. $12 per person covers dinner and dancing; $6 for dancing only. Contact Mary Alice Eubank at C-Site or Kate McDermott in personnel for more information. Tickets are on sale through Wednesday, December 19th.

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HAPPY BIRTHDAY PLT!

FIRST PLASMA – 12:45 A.M. DECEMBER 20, 1975

101st Year · No. 251 SUNDAY, AUGUST 13, 1978

U.S. Makes Major Advance in Nuclear Fusion

Science nears control of fusic

By DAN FREEDMAN
Courier-Post Staff

Fusion device yields heat of 10,000 suns

WASHINGTON (AP) — An experimental fu... achieved a temperature 10,000 times hotter t... of the sun in what federal energy officials ... toward the distant goal of fusion power.

At Innsbruck; Scientists Map Advances in Fusion

Record Temperature Gained For Sustained Fusion

PRINCETON, N.J. — The Depart... Energy, announced today that the ... device has a

By WARREN E. LEARY
Associated Press

Princeton Discovers Technique For Fusion

Sonnige Zeiten für die Menschheit

Energie im Überfluß – aus Wasser. Und ohne Strahlengefahren. Amerikanische Wissenschaftler rückten dem Traumziel einen entscheidenden

Un passo decisivo degli scienziati americani per il con... ollo della fusione nucl

«Scoperta» elettricità a buon merc

...stato in laboratorio lo stesso tipo di reazione che produce l'energia solare - Finora ...

After 60,000,000° Celsius, what?

By WARREN E. LEARY
Associated Press