

ITER: thinking together internationally for fusion

by Phyllis Rieger

When international collaboration on fusion was first proposed, it seemed to some an impossible feat. Physicists and engineers speaking different languages and having varied backgrounds and cultures would have to think and work together in designing and, hopefully, implementing the world's next large step for testing the science and technology of thermonuclear fusion—the International Thermonuclear Experimental Reactor, better known as ITER (pronounced “eater”).

The overall objective of ITER is to demonstrate the scientific and technological feasibility of fusion power. ITER will accomplish this by demonstrating controlled ignition and extended burn of a deuterium and tritium plasma with steady state as an ultimate objective. The experiment will demonstrate technologies essential to a reactor in an integrated testing of a high heat flux and nuclear components required to utilize fusion power for practical purposes. The operation of ITER should demonstrate the potential for safe and environmentally acceptable operation of a power-producing fusion reactor.

Since the spring of 1987 when the International Atomic Energy Agency (IAEA) invited representatives of the European community, the U.S., the U.S.S.R. and Japan to discuss enhanced international collaboration on fusion, several significant steps toward the building and operation of an international reactor have been accomplished.

Instrumental in this multinational achievement are PPPL physicists Drs. Paul Rutherford, Douglass Post, Jr. and Sam Cohen. Dr. Rutherford, head of PPPL research, is one of 12 members of the ITER Scientific and Technical Advisory Committee (ISTAC). Dr. Post is leader of the ITER Physics Group with Dr. Cohen in charge of the impurity control work for ITER in the U.S.

The ITER Physics Group consists of about 15 physicists who engage in the joint work at Garching, West Germany (the central site for discussions for the physics and engineering aspects of ITER), plus about 20 physicists per country who remain in each home country. These individuals are assigned to subgroups which work on specific tasks and with different engineering groups.

Other PPPL physicists who are leaders of ITER Physics work in the U.S. include Roscoe White, Alpha-Particle Physics, and Ken Young, Diagnostics. About ten other PPPL physicists are involved in various aspects of the design work.

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According to Doug, “The Physics Group has the responsibility for providing physics guidance and specifications for the tokamak design. These include: physics guidelines, such as optimum methods to use for current drive; specifications, such as plasma current required for ignition, maximum toroidal field ripple, etc.; plans for the experimental operation of ITER, and identification of the physics research and development required for ITER.” He said the group spends about six months a year in Garching for discussions.

Doug stated that, “During these meetings, the Physics Group identified a number of physics areas which are crucial for ITER. These are: enhanced energy confinement, working conditions of the plasma-facing components (such as plasma wall interaction) and the impact of plasma disruptions on these components and the mechanical structure of the machine.” Doug said other discussions focused on the choice of heating and current-drive systems and plasma equilib-

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Law enforcement awareness at PPPL

PPPL employees are reminded of their obligation to report criminal conduct at the Laboratory, including waste, fraud, and abuse of federal property. There are several avenues open to staff.

An individual may report suspected waste, fraud, and abuse of federal property or other criminal conduct, in confidence, to his or her Supervisor, the Supervisor's Manager, or the Division Head. In criminal matters, the individual must ensure that Allan Guyet, Director of Public Safety, has been notified. In all instances, Mr. Guyet will work with the appropriate local, state and/or federal law enforcement agencies in a confidential investigation of employee complaints.

Another option open to employees is the Office of the Inspector General of the U.S. Department of Energy. This office maintains a 24-hour telephone Hotline specifically for reporting fraud, waste, and mismanagement. The toll-free number is 1-800-541-1625; the commercial number is 1-202-586-4073; and the FTS number is 896-4073.

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rium control. Data from TFTR and PBX-M are expected to contribute heavily to the design as well.

During last summer the physics group of 15 met in Garching for intense discussions and Doug said, "Even though we had very different backgrounds and languages, we quickly began to function as a team working towards a single goal: the best possible design for ITER. The result was agreement of all parties on the set of para-

meters and specifications that were incorporated in the ITER concept definition."

November 1988 marked the issuance of the ITER Definition Phase Report. The team will meet again in Garching from June to October to finish the next phase of the design. This is one accomplishment that signifies progress toward the many other steps involved in such an international undertaking. A detailed engineering design is expected to be completed by 1990 with site selection in 1994. Doug said, "At this point where to site ITER is a very open

question. The U.S. Department of Energy has formed several committees to discuss the siting issue."

He also said from the U.S. ITER team perspective that, "We feel we (the U.S.) have had a reasonable impact on the choice of the parameters of ITER and on the design."

Doug continued, "We're looking forward to the work session this summer to develop a more detailed picture of the physics issues for ITER and to look for ways to improve the design." *



Working together for fusion is this group of scientists and engineers from various countries. PPPL's Doug Post is at far left. The photo was taken at Garching, West Germany.

PPPL opens physics world to students

by Phyllis Rieger

Usually the first question asked on a job interview is: what's your job experience? For most college graduates the answer is none, but not for some students at Drexel University in Philadelphia enrolled in the Cooperative Education Program. This program enables students to gain on-the-job experience while earning college credit. Participating in the program does mean that it takes five years to complete college instead of the usual four, but as Peter LaSalle, a student who just completed his term at PPPL, said, "Nowhere else would I be able to work with physicists

of such high caliber and work in an environment where I'm treated as part of the project."

Peter, a physics and math major, said an additional bonus is the money he earned which paid about half of his yearly tuition of \$8500. Because of his PPPL experience, he plans to continue his education by going to graduate school for a program of applied physics in computers or solid state physics.

While at PPPL, Peter worked with physicist Dr. Ken Hill, Head of the TFTR Spectroscopy Branch of the Diagnostics Division. Coincidentally, Ken is a graduate of Drexel with a B.S. Degree in Phys-

ics. "I also participated in a cooperative education program while at Drexel," said Ken, who spent his cooperative time at the Oak Ridge National Laboratory.

He explained, "Peter carried out a number of assignments while working at PPPL. He helped with diagnostics measurements, wrote computer programs, analyzed data, etc. Having him work here helped me and others gain time to do other projects."

Ken said, "I think this type of program is invaluable. You're introduced to the type of work you may be doing later in your

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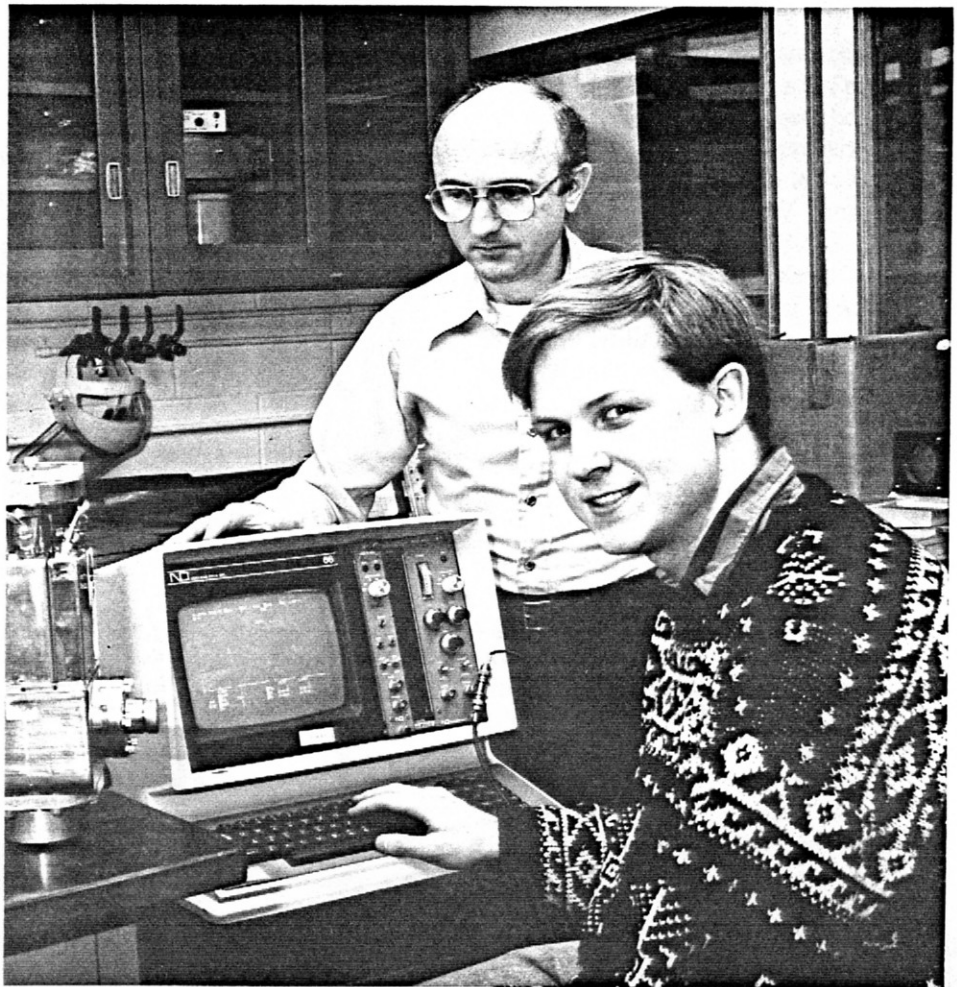
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field of study and to professionals in your field. It seems to be a rewarding experience for most."

Physicist Dr. Alan Ramsey, who's worked with Drexel students for the last five years, said, "I think cooperative education programs provide valuable job experience in many ways. Students obviously gain on-the-job experience, but also have the opportunity to see if a physics career is really for him or her. Or a student may decide that a certain aspect of physics is more appealing than others. The time spent here is intensive and a student works very hard."

He explained that Drexel University organizes the program, and resumes of candidates are reviewed by the PPPL research staff. A student is assigned to work with a particular physicist who acts as a mentor helping the student while he/she's here.

Dr. Ramsey said, "I've taught several of the students who worked with me to turn on diagnostic equipment and to verify its operation. This saves a lot of time for the permanent research staff. For example, I usually show a student how to analyze simple data from a TFTR run, which enables me and the other physicists to spend time doing more detailed data analysis. The program is a good introduction to the working world of physics." *



(Photo by John Peoples)

Physicist Ken Hill (rear) works with Drexel University Cooperative Education student Peter LaSalle.

Cafeteria—seats, eats, and treats

by Phyllis Rieger

"A cafeteria should be a place where you take a break from the work day so you can feel refreshed," said graphic artist Terry Birch who patronizes the cafeteria every day for lunch and afternoon coffee.

"I rate our cafeteria B+ for its well-prepared, varied selections. Overall, I think the staff is courteous and friendly," said Terry among whose favorites are tomato soup and tuna fish sandwiches.

Such comments please Cafeteria Manager Jackie Yull who explained, "All of our salads are fresh and prepared from scratch." The cafeteria is under the management of Brock & Co. with Jackie overseeing its daily operation. "Essentially this means I'm a kind of a jill-of-all-trades,"

said Jackie. "I'm responsible for planning and ordering the food which means I work with 19 different vendors weekly. Sometimes I handle the cash register and when necessary help in other areas. I also plan the menus which change weekly and are not repeated," she pointed out.

A new menu is generated each Thursday and includes two kinds of soup, two hot entrees, a hot and cold sandwich and a dieter's special although Jackie said she doesn't notice a trend by PPPLers toward lean cuisine.

"However, Mexican food is popular so we will be serving more of it in the future. We're also planning a 'make your own sandwich' bar," she said. From her informal research, PPPL favorites include reu-

bens, pork roll with cheese, and grilled cheese with tomato sandwiches. About 400 cups of coffee are sold a day, making coffee another favorite.

Overseeing food preparation is chef Clarence King who can be seen dressed in his "whites" while cooking. A graduate of the Maritime Culinary Institute in New York, Clarence obviously relishes his role as the concocter of culinary delights, such as his special meatloaf a la Clarence. He has been managing PPPL's kitchen for five years and can be seen greeting customers with a friendly smile announcing, "We have some very fine roast beef today." He personally carves the roast or serves whatever his specialty is that day. "You can tell

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he enjoys his job," said Terry Birch. "He always has a positive attitude."

Food preparations begin with the first cafeteria employee arriving at 5:30 A.M. so that breakfast will be ready for the first Lab staff. Working with Clarence and Jackie are: Vi Lewis, supervisor; Marion Smith, breakfast cook; Jeff Brian, dishwasher; Clarence Canty, cook's helper; Dick Donovan, general utility; Rose Barnes, salad bar and sandwiches; Cynthia Stoddard, grill; Simone Thomas, cashier, and Talaya Stoddard, cashier.

Jackie stated that sales vary depending on the week and menu. "For example, Ethnic Week was not a big seller but every Thursday is Italian Day which is successful."

This month the cafeteria is sponsoring a "Trivia" contest with a new question written on the blackboard each day. The prize is a free breakfast or lunch. A weekly raffle is also planned.

"PPPLers do voice complaints and suggestions," according to Jackie who noted, "About 98% of the people are easy to talk to, and if they have a problem, it's usually legitimate."

A recent survey by the Cafeteria Committee showed employees who use the

cafeteria are well-satisfied with cafeteria operations, food preparations and service with 83% of responders rating the quality of food at breakfast as fair to good and 87% saying the same about lunch.

All PPPL employees are encouraged to use the cafeteria. Higher sales help keep

prices down, and all cafeteria customers benefit. Comments relating to menus and cafeteria service may be directed to any member of the PPPL Cafeteria Committee, including: Stefano Bernabei, Dottie Pulyer, Tony DeMeo, Tim Bennett and Olga Bernett. ☼



(Photo by John Peoples)

Cafeteria Manager Jackie Yull with Chef Clarence King prepare a big batch of pasta for Italian Day.



(Photo by John Peoples)

These students are all smiles as winners of the SEER competition. PPPL engineer Charles Ancher (left) and secretary Mary Ann Brown (right) served as judges.

PPPL honors eight corporate award winners

by Phyllis Rieger

Budding scientists and engineers toured PPPL on June 1 and had the opportunity to discuss their top-ranked science projects as PPPL hosted eight winners of the Student Exposition on Energy Resources (SEER) competition.

The students from grades six, seven and eight, represented schools from around the state in the science fair which celebrated its tenth anniversary this year. Because there are almost 1,000 entries, the competition is held simultaneously at two different locations, Morristown and Lakewood.

The SEER competition is sponsored by the New Jersey Chapter of the National Energy Foundation. The science-fair-type

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competition is designed to stimulate and challenge students to think about energy and energy-related technologies and to provide them with an opportunity to develop their skills in scientific research and experimentation. Many of the students, such as PPPL Corporate Award Winner James Izzo who plans a career in robotic engineering, will pursue science careers.

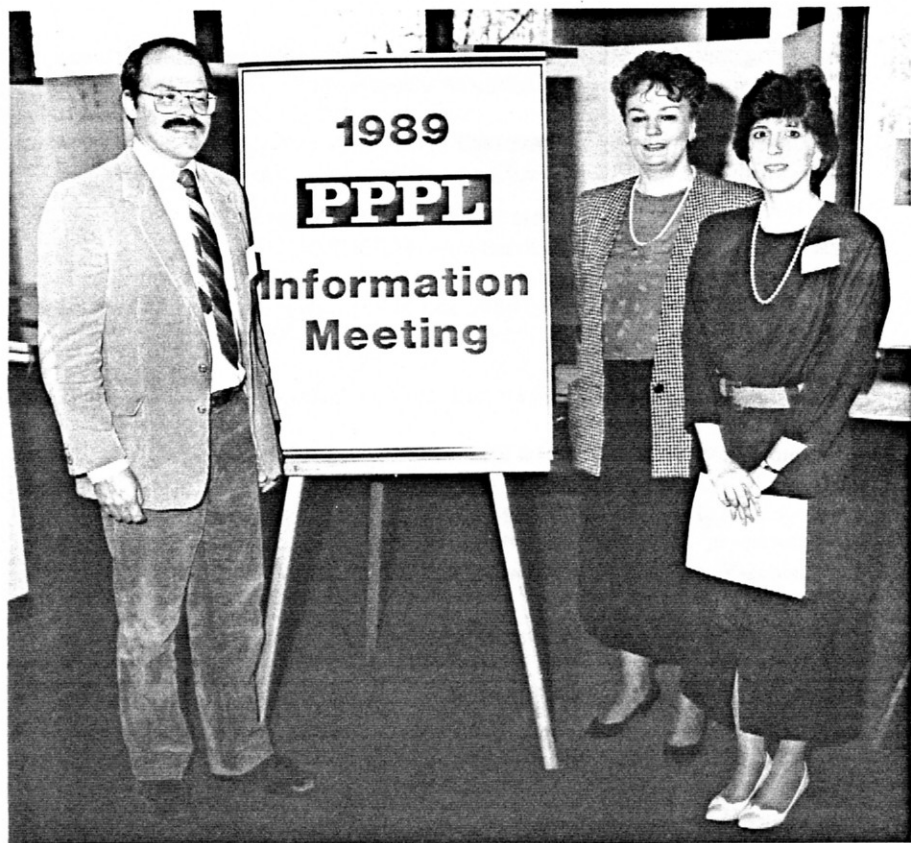
New Jersey companies and institutions are invited to sponsor corporate awards, which are given in addition to the National Energy Foundation's SEER awards. Since 1983, PPPL has been involved in SEER in two ways. Awards are given to the winning students and PPPL staff serve as judges. PPPL judges for 1989 included: Mary Ann Brown, who coordinated PPPL's awards presentation; Head of Engineering Jack Joyce, and engineer Charles Anchor. Other judges included: Martin Brown, an engineer at AT&T, Brian Brown and John Bradish from Princeton University's Engineering Department.

Each year winners are invited to tour the Laboratory and be recognized for their achievements at a special luncheon. ✱

Our best story ideas for HOTLINE and "In Focus" come from you. So if you have an idea for an article or video segment, call Information Services. For HOTLINE, call Carol Phillips at ext. 2754. "In Focus" ideas can be channeled to Ed Farris, ext. 2090, or Phyllis Rieger, ext. 2752. What's your news?

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Produced by Carol Phillips



(Photo by Ed Farris)

Representatives from industry, universities, government, and other fusion laboratories attended the 1989 PPPL Information Meeting on May 9. Opportunities for collaboration with other academic institutions, laboratories, and industry and potential avenues for extending this cooperation into the future were the main topics of the meeting. Formal presentations describing PPPL's research programs were given in the morning. In the afternoon, attendees toured TFTR, perused the posters on display, and had private discussions with PPPL staff. Physicist Pat Colestock (left) served as Program Chairperson. He was assisted by Dolores Lawson (far right) and Gloria Cain (center).

1988 inventors recognized; technology transfer potential emphasized

Nearly forty PPPL inventors were honored May 18, 1989 at the annual Patent Recognition Dinner held at Prospect House. The Committee on Inventions hosted the dinner for inventors and guests as part of the PPPL Patent Awareness Program. John Lowrance and Shoichi Yoshikawa were also recognized during the dinner for their service on the Committee on Inventions, since this marked the end of their participation, and Charles Staloff was introduced as a new member of the Committee.

Chairperson John Johnson remarked on the importance of and desirability of filing more invention disclosures and the very real potential for inventors to see their patents licensed by the University and the technology transferred to industry. Al Sinisgalli, Associate Provost for Research and Project Administration, emphasized the University's continued strong support and involvement with PPPL's patent program, and local U.S. Department of Energy Area Office Head, Milt Johnson, reaffirmed DOE's objective of giving inventors and the University the opportunity to transfer technologies developed at PPPL to private industry.

Laboratory Director, Harold Furth, arriving directly from a meeting in Washington with Secretary of Energy Watkins, encouraged the inventors to continue inventing and

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developing new ideas, particularly with technology transfer potential. He also shared with the group some of the vision Admiral Watkins showed during their earlier meeting; namely, that we should share our scientific and engineering expertise with local communities, specifically by getting involved in the science education of children of all ages.

Dr. Furth then presented Certificates of Recognition to the following:

Patents Issued in Fiscal Year 1988

First Wall for Polarized Fusion Reactors — #4,721,595

H. Greenside, R. Budny, D. Post

Apparatus and Method for Generating Soft X-Ray Lasing Action in a Confined Plasma Column Through the Use of a Picosecond Laser — #4,704,718

S. Suckewer

Compact Waveguide Power Divider with Multiple Isolated Outputs — #4,704,589

C. Moeller

Spheromak Reactor with Poloidal Flux-Amplifying Transformer — #4,713,208

H. Furth, A. Janos, T. Uyama, M. Yamada

Enhancement of Soft X-Ray Lasing Action with Thin Blade Radiators — #4,771,430

S. Suckewer, C. Skinner, D. Voorhees

Anomalous-Viscosity Current Drive — #4,767,590

T. Stix, M. Ono

Rotating Shielded Crane System — #4,746,485

J. Commander

Fusion Reactor Pumped Laser — #4,746,484

D. Jassby

Statutory Invention Registration in Fiscal Year 1988

Method of Controlling Fusion Reaction Rates — #H446

R. Kulsrud, E. Valeo, H. Furth, M. Goldhaber

Inventions Disclosed in Fiscal Year 1988

Method of Measuring Plasma Density and Density Gradient by Use of a Waveguide Array

R. Pinsker

Rotatable "L" Probe

J. Bilinski, A. Janos, Y. Ono

Multichannel Detector Data Acquisition and Analysis Software for Apple Macintosh

Y. Chung, S. Suckewer

Use of Neutral Probe Beams to Study MHD Mode-Energetic Ion Resonances in Fusion Plasmas

R. Kaita, V. Varadarajan, R. White

Method of Sustaining a Radial Electric Field and Poloidal Plasma Rotation Over Most of the Cross Section of a Tokamak

D. Darrow, M. Ono

Spoke Wheel Magnetic Probe Array

R. Labaw, J. Bilinski, A. Janos, Y. Ono

Pole-Biased Sputtering System

S. Cohen

Compound Divertor Plate

S. Cohen, M. Petravic

Ion Cyclotron Window Washer

R. Goldston

Amplitude and Phase Detector for Radio-frequency Measurements

G. Cutsogeorge

Poly WEP Neutron Moderator

A.L. Roquemore, S. Raftopoulos, R. Shoemaker

Rotatable Target System for X-ray Laser

D. Kim, C.H. Skinner, S. Suckewer

Saf-T-Rak

J. Swatkowski, H. Swiderski

Pyrolysis of Chemical Compounds by High-Speed Injection of the Solid or Liquid into Large, High-Temperature Plasmas

D.H. McNeill

Safety Training

The Occupational Safety Branch has scheduled the following safety training courses for June:

- **Laser Safety** — 20 June, 9:00-11:00 a.m. in the Safety Training Trailer
- **Fire Extinguisher** — 21 June, 9:00-10:30 a.m. in the Safety Training Trailer
- **Basic Electrical Safety** — 22 June, 9:00-10:30 a.m. in the Safety Training Trailer

Employees must obtain permission from their immediate supervisor to attend these classes. Supervisors should call Mary Ann McBride at ext. 3468 to enroll their employees.

Basic Safety is offered every Monday at 1:30 p.m. in the Safety Training Trailer.

Obituary

George Ioannidis died on June 1. George, who was a Technical Assistant in the Engineering Department, had been a Laboratory employee since 1974. He is survived by his wife, Irene, a daughter, Joanna, and a son, George.

Correction

In the last issue of HOTLINE it was incorrectly stated that former employee Barton Reavis died in November 1988. This was incorrect. Mr. Reavis died in April of this year. We are sorry for this misinformation.

Thank You

I would like to thank everyone for the warm personal concern shown by my friends and co-workers here at PPPL and for the many cards of condolences I received when my sister died.

Eleanor Schmitt