

Hotline

The Princeton Plasma Physics Laboratory is a United States Department of Energy Facility

Krebs Meets PPPL Staff During Visit

In 45 minutes flat, DOE Office of Energy Research Director Martha Krebs saw the flash of a new experiment, the continuing vigor of tokamak research, and the promise of a new generation of plasma physicists.

Krebs took in the sights of PPPL — meeting staff and students and becoming acquainted with projects — during a November 17 visit. Accompanied by N. Anne Davies, the Associate Director for Fusion Energy at the DOE's Office of Energy Research, Krebs met



Richard Hawryluk shows Martha Krebs TFTR. Behind Hawryluk is PPPL Deputy Director Dale Meade.

with Laboratory and Princeton University officials, toured PPPL, and had lunch with about 50 PPPL'ers. Said PPPL Director Ronald C. Davidson, "We had a very good private session with Martha and Anne and also an excellent walkaround, which gave them a sense of the outstanding facilities and infrastructure here, and of the dedicated people behind the scenes."

The tour began with a stop at the Magnetic Reconnection Experiment

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MRX Produces First Plasma

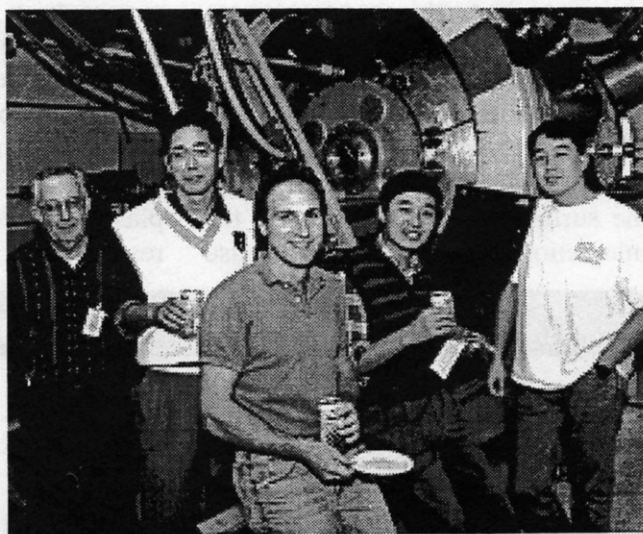
On the afternoon of October 17, Laboratory Director Ronald C. Davidson flipped the switch at the capacitor banks that power the Magnetic Reconnection Experiment (MRX) as an anticipatory group peered through a protective window. Then, in a flash, a bright double plasma ring sliced through a rich pink background plasma.

The twin rings were the first plasma produced by MRX, a double spheromak device. MRX is the first toroidal experiment to come on board at PPPL in nearly a decade.

Said Davidson, "My congratulations to Masaaki Yamada and his colleagues for bringing into operation this versatile facility. MRX will play a critical role in developing a fundamental understanding of magnetic reconnection in space and laboratory plasmas."

Yamada, the Principal Research Physicist who is directing the research, said the experiment focuses on magnetic

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From left are Ray Pysher, who helped on MRX, Masaaki Yamada, Head of the MRX Project, and MRX team members Dave Cylinder, Hantao Ji, and Scott Hsu. Not pictured is Troy Carter.

MRX

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reconnection — the topological breaking and rapid reconnections of magnetic field lines in a plasma medium.

Magnetic reconnection is seen in a wide range of plasmas from the sun to tokamaks. Through the experiment, researchers will try to solve the puzzle of how it occurs.

"Magnetic reconnection is one of the most fundamental processes of plasma physics with important relevance to fusion research. The experiments will reveal the essential physics of the interplay between plasmas and the magnetic field," said Yamada.

While the magnetic field is a way to confine the plasma, a loss of confinement often occurs when the plasma interacts with the field lines. Frequently, the plasma changes its configuration and the magnetic field lines open up, leading to diminished confinement. Thus, magnetic reconnection is an important fundamental issue for magnetic fusion.

In addition to its experimental relevance to fusion research, magnetic reconnection is important to the physics of the earth's magnetosphere and solar flare evolution. It may additionally play a key role in heating the plasma in the sun's corona.

Through MRX, researchers can study the phenomena happening in the surface of the sun, namely the interaction of the solar flares, also

known as plasma rings. "Our plasma has two rings so we can simulate the physics of the solar corona interaction," Yamada said, explaining that MRX produces two plasma rings to let them merge together by magnetic reconnection.

He noted that MRX may also reveal why the corona is dramatically hotter than the sun's surface. The corona, which is the outermost atmosphere of the sun, reaches temperatures of 2,000,000 degrees Celsius whereas the surface of the sun is 6,000 degrees Celsius.

"Our plasma has two rings so we can simulate the physics of the solar corona interaction."

—Masaaki Yamada

With experimental results of interest to the solar physics, astrophysics, and space physics, as well as the fusion communities, MRX is an example of the cross discipline of basic plasma science. Yamada noted the July meeting in Scotland on the "Interrelationship Between Plasma Experiments in the Laboratory and in Space," which he co-organized. Magnetic reconnection was one of the essential topics at the workshop, which brought together active members of the space and laboratory plasma physics communities. MRX results could play a key role in the

interpretation of data from the Yohko satellite that was launched by a joint effort of the U.S. and Japan and has captured pictures of solar flares and arcades.

Funding for the experiments is equally diverse, coming from the National Science Foundation, the National Aeronautics and Space Administration, the Office of Naval Research, and the U.S. DOE.

Since the first plasma, more than 300 discharges have been already obtained on MRX. To celebrate, Yamada threw a "MRX First Plasma" bash on November 1 in the L-wing.

"We had sushi and pizza, an interesting mixture, just like MRX," said Yamada, noting the diversity of funding sources and of the plasma physics disciplines interested in the results.

The MRX Head offered special thanks to PPPL's theory group, Russell Kulsrud, Neil Pomphrey, and the engineering technical staff for their strong support of the project.

Listen to the Plasmas

Said Yamada, "The most important goal of the MRX experiment is 'to listen to the plasmas' to find out the key physics for the interplay between the plasma and the magnetic field. Many people from plasma physics and other communities have resonated with this spirit and supported us. I would also like to thank the many people of PPPL who helped with the construction of MRX for their truly constructive support." ●

HOTLINE

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Japanese Industrial Labor Union Representatives Tour PPPL



In November, about 30 visitors from Hokkaido, Japan, including representatives of major industrial labor unions and governmental officials, toured the Laboratory. At left is Masaaki Yamada, who led the group through the TFTR Test Cell. The visit included welcoming remarks from PPPL Director Ronald C. Davidson, an overview of PPPL's fusion program by PPPL's Yamada and Michio Okabayashi, and the tour of TFTR. Hokkaido is presently campaigning for the siting of the International Thermonuclear Experimental Reactor and the visitors are traveling to various fusion centers to gather information.

FY95 Trial of the Improved PPPL Audit Program

by Judy Malsbury

*In an earlier **HOTLINE** (Vol. 16, No. 13, June 9, 1995), changes to the PPPL Audit Program to be trialed in FY95 were announced. These changes were suggested by a cross-functional task force created to improve the audit program and to assure that the program supports the mission of the Laboratory. The task force consisted of J.W. Anderson, Jerry Gilbert, Frank Malinowski, Judy Malsbury, Sue Murphy, Wayne Reiersen, Dick Shoe, Rod Templon, and Al von Halle, with Frank Patrick of AT&T Qwest as the facilitator.*

Three audits were performed in FY95 that tested the suggested changes. A formal report of the results is available for access on the PPPL employees' Information Services WWW page within the Support Services Department, Quality Assurance area under the name "Results of FY95 Audit Trial." During the audits, surveys were given to both interviewees and the managers of the programs or systems being audited. The surveys provided feedback that, while indicating some refinement was needed, was overwhelmingly supportive of the changes. Details on the results of the survey are available in the complete report.

One of the most appreciated changes was inclusion on the audit team of personnel from both the organization and personnel that used that organization's services. The benefits were that the team had familiarity with the audited organization, increased subject expertise, and improved communication which made the audit more efficient, more accurate, and better accepted.

Perhaps the success of the new approach could best be summarized in the words of one of the auditors: "At its core this audit was performance based rather than compliance based ... This basis is a natural outcome of the composition of the team and the checks and balances of the ... process ... If we had formed a process improvement team ... our audit team is what it would have looked like. So not only can you take credit for the audit but for improving the process as well.

Because we concentrated on the process instead of the requirements, we were able to understand why things were done the way they were, and then to see if things met the requirements. This established a chain of evidence from the bottom up, allowing us to provide clear statements as to the finding, why it was important, and how it could be dealt with. This is clearly a proactive approach to auditing. I think all internal audits should go this way."

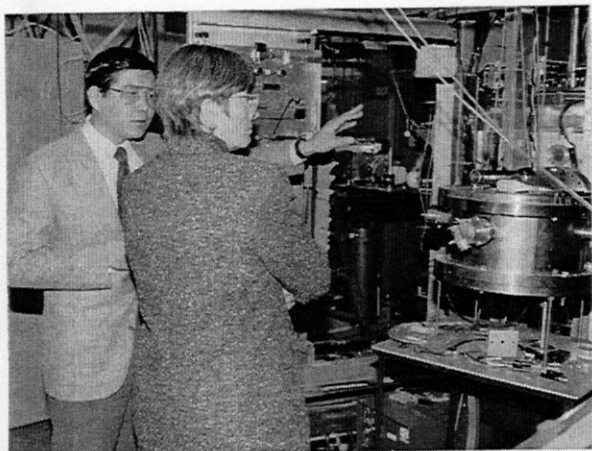
Krebs

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(MRX) and culminated in a loop around the TFTR Test Cell. Krebs and Davies saw a plasma shot fired at MRX and were welcomed by Principal Research Physicist Sam Cohen at the Plasma Processing Lab.

New Spherical Tokamak

Then it was on to visit the Current Drive Experiment-Upgrade tokamak device, where Krebs and Davies were greeted by CDX-U Project Head Masayuki Ono and met Martin Peng of Oak Ridge National Laboratory (ORNL). Peng described the National Spherical Tokamak Experiment, a new spherical tokamak facility being designed at PPPL in collaboration with ORNL and various university groups.



Masayuki Ono describes the Current Drive Experiment-Upgrade (CDX-U) to Krebs during the tour of PPPL.

At the Graduate Student Lab, the Krebs' entourage paused to hear the plasma physics pupils describe their projects. There are six different experiments used in the Graduate Lab course taught by Cohen including a Pachen curve apparatus; a plasma thruster; a glow discharge and low voltage arc Langmuir probe experiment; a magnetron sputtering/spectroscopy experiment; a hollow cathode microwave interferometry experiment; and a microwave cavity

resonance experiment. The students in the class learn, first hand, how the theory and phenomena about which they have learned in their other courses are manifested in actual plasmas. This experience provides the students with training valuable for fusion research, astrophysical sciences, aerospace research, plasma-based illumination, and semiconductor processing techniques.

Said Cohen, "This Laboratory, built from equipment accumulated in over four decades of research, is used not only for Princeton students, but also for students from colleges and universities all over the U.S., through our National Undergraduate Fellowships Program and our program for students from historically black colleges and universities."

After TFTR Heating Systems Division Head Al von Halle pointed out the power supplies, the tour group headed to the ESAT Building, where Krebs and Davies donned protective eyewear to watch a test of a small experimental electric arc furnace. This furnace is modeled on those used on an industrial scale for steel recycling. "Slightly modified versions of this type of furnace have also been used to destroy toxic chemicals or to vitrify (i.e., glassify) radioactive wastes," said Principal Research Physicist Stewart Zweben. He noted that the protective eyewear was necessary to guard



Principal Research Physicist Stewart Zweben greets Martha Krebs in the ESAT Building. Behind them are Computer Systems Division Head Dori Barnes and TFTR Heating Systems Division Head Al von Halle.

against the bright light emitted by the arc.

Small-Scale Furnace

This small-scale furnace will be used in a "work-for-others" proposal being developed with Asea Brown Boveri for improving the operation of steel furnaces, and can also be adapted for research and development work on hazardous waste remediation for DOE or other government agencies.

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From left are Martha Krebs, MRX Head Masaaki Yamada, Engineering and Technology Development Department Head Michael Williams, and Dori Barnes watching a plasma shot on the Magnetic Reconnection Experiment device.

Krebs

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The final leg of the tour was a stop at the TFTR Test Cell, where Tokamak Confinement Systems Department Head Richard Hawryluk led the way. "This is the machine," he said, pointing to TFTR. "And it is a machine we are all very proud of. As you know, last year TFTR produced 10 megawatts of heating power."

At the conclusion of the tour, Krebs and Davies joined PPPL and DOE employees for lunch, during which Krebs spoke.

Referring to the recent reduction-in-force at PPPL and to the shrunken budget for fusion, Krebs said she would rather have visited under happier circumstances. However, she added, just as one would visit a family member during troubling times, she wished to be present when a member of the DOE "family" was going through a hard time.

"To have any part of the family going through difficulties is difficult for me," Krebs said.

Tremendous Impact

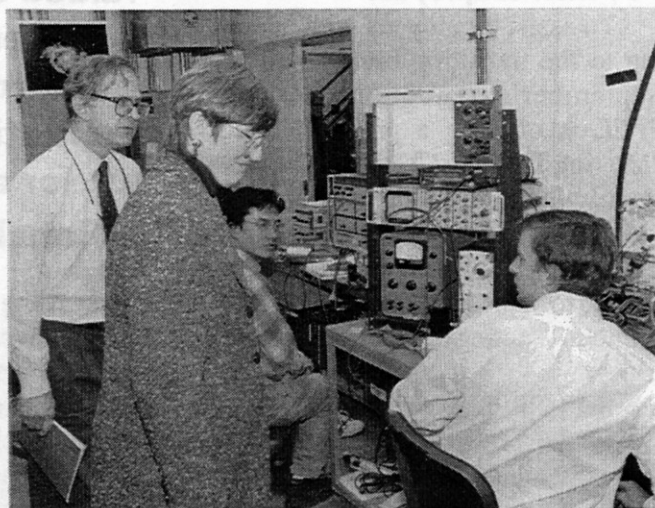
Krebs lauded the Princeton team, saying the science at PPPL has had a tremendous impact on both the scientific achievement and understanding of high temperature fusion plasmas while making it much more possible to achieve the ultimate energy goal.



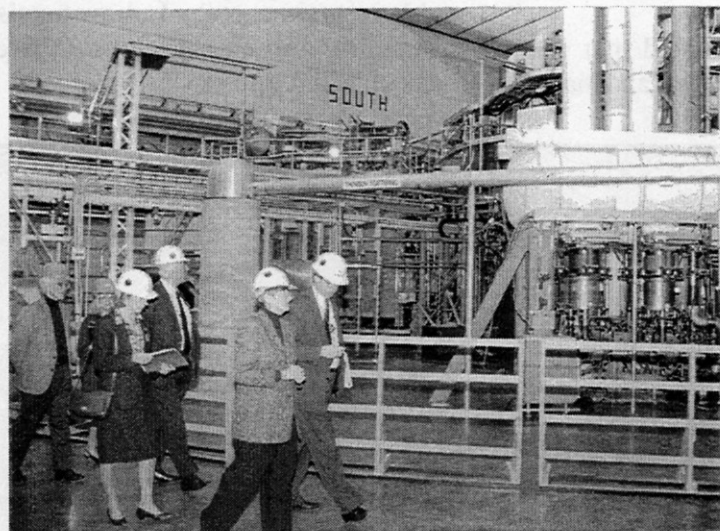
Tokamak Confinement Systems Department Head Richard Hawryluk presents a framed photograph of TFTR to Martha Krebs.

She conveyed how "personally frustrated" she is by what's happening to fusion as a result of a lack of Congressional support. The decision by Congress to reduce the fusion program reduces the possibility of having fusion as an energy resource by the middle of the next century, said the DOE official.

"Ultimately we have to try to figure out what we have to do next," Krebs said. ●



Sam Cohen (standing at left of Krebs) and Martha Krebs chat with students at the Graduate Student Lab.



Touring the TFTR Test Cell are, from left, Milton Johnson, DOE Princeton Group Manager, N. Anne Davies, Associate Director for Fusion Energy at the DOE's Office of Energy Research, PPPL Deputy Director Dale Meade, Martha Krebs, and Richard Hawryluk.



Making the rounds on a tour of PPPL are, from left, Martha Krebs, Richard Hawryluk, N. Anne Davies, Michael Williams, Dale Meade, and Dori Barnes.

"Moving Through Change"

Shock. Anger. Bargaining. Depression. And, finally, acceptance.

These are the five stages people go through when facing a significant emotional event that forces a change upon them. Personally, this event could be the loss of someone close or a serious illness. Professionally, it could be a reduction-in-force.

To Assist Employees

To assist employees with adapting to the transition brought on by September's reduction-in-force, PPPL is offering a program titled "Moving Through Change." The program, which includes a 45-minute videotape, "Managing Change and Transition," offers coping skills needed to manage change and to avoid burnout, "acting out," and serious illness.

Said PPPL Director Ronald C. Davidson, "The loss of so many valued colleagues in the recent reduction-in-force is a very traumatic experience for all of us, and I urge you to participate in this excellent program to help cope with the change."

Ben Bissell, who is featured on the training tape, said the five stages are both "normal and necessary." In

addition, they will take some time to get through.

"It takes a minimum of one-and-a-half years to work through these five stages," the speaker said. If people are unable to work through the stages in two years, they either get burned out and quit, become difficult to work with, or develop an illness.

"The loss of so many valued colleagues in the recent reduction-in-force is a very traumatic experience for all of us."

—Ronald C. Davidson

According to the video, employees can expect their staff to move through the stages at different rates, hopping from one to another and occasionally back to an earlier stage.

All the stages are basically feelings—not behavior. And while these feelings are not an excuse for failing to perform work duties, managers should expect their employees to have them.

The speaker noted that change produces loss and fear, and managers

can combat their employees' fear by keeping them informed. Managers should also try to keep as many things unchanged as possible so that employees have some stability. "Familiarity is important," he commented.

To better adapt to change, employees should bring new people into their support systems, take good care of themselves physically, and set aside some time to be children again.

Laboratory work groups are encouraged to participate in the "Moving Through Change" program. The videotape, participant guides, and facilitator's notebook—generally used by department heads in leading employee groups—are available through the Training and Certification Office. Group discussions, led by the facilitator, occur at the conclusion of each section of the video.

"Step one is the video. Step two takes place when managers help work groups deal with change," said Training and Certification Head Sue Murphy, who encourages employees to view the video in a group. ●

[Work groups who wish to view the video can contact the Laboratory's Training and Certification Office at ext. 2220.]

United Way Kicks Off

Door Prizes Sought



The 1995 United Way Campaign is kicking off! United Way Campaign Drive meetings are scheduled for Monday, December 18. Watch for a special edition of **HOTLINE** for details. In the meantime, if you would like to make a donation of a gift to be drawn during the meetings, call Steve Iverson at ext. 2007. Contributions in the past have included homemade craft items, tennis lessons, and gift certificates to area restaurants, exercise classes, and hair salons.