

## University Honors Stix *Distinguished Teaching Award Given*

Professor Thomas H. Stix was recognized for his contributions to academics with the first annual University Award for Distinguished Teaching during Princeton's Opening Exercises at the University Chapel on September 15. Stix has been a professor of Astrophysical Sciences since 1962, was Associate Chair of the Department from 1981 until this September, and has served as PPPL's Associate Director for Academic Affairs since 1980.

At the award ceremony, University President Harold T. Shapiro said, in part, "*Professor Stix led the graduate program in plasma physics*

*ics with style and grace, maintaining a deep interest in the personal and professional well being of each student. His research has offered his students a powerful statement of the vitality of creativity; and by his example and encouragement he has won to the field many who themselves have gone on to be leaders in the plasma physics community.*"

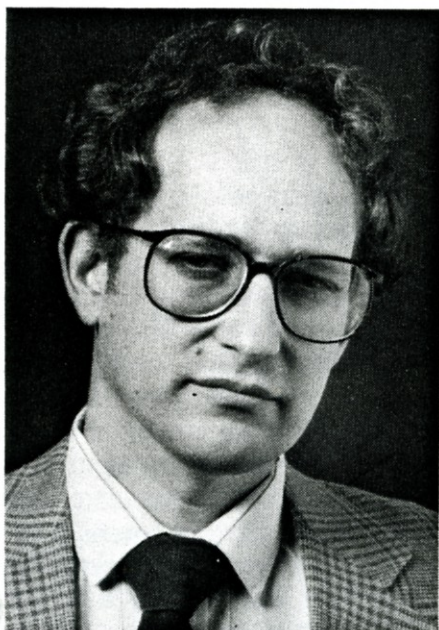
Director of PPPL Ronald C. Davidson said, "Professor Stix's distinguished career as educator and intellectual leader of the Graduate Program in Plasma Physics dates back to when I was a graduate stu-

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**Professor Thomas H. Stix, winner of the first annual University Award for Distinguished Teaching.** Photo: John Peoples

## Fisch to Direct Graduate Studies



**Professor Nathaniel Fisch, recently appointed Director of Graduate Studies and Director of the Program in Plasma Physics.** Photo: Denise Applewhite

Professor Nathaniel Fisch has been appointed Director of Graduate Studies and Director of the Program in Plasma Physics in the Department of Astrophysical Sciences.

Said PPPL Director Ronald C. Davidson, "Education of many of the Nation's leading plasma physicists is one of the most important contributions to plasma science and technology made by the faculty and research staff at PPPL. I am delighted with Professor Fisch's appointment as Director of Graduate Studies, and I am confident that he will provide outstanding leadership to the Program in Plasma Physics during the years ahead."

Fisch, who joined PPPL in 1978, received his B.A., M.A., and Ph.D. from the Massachusetts Institute of

Technology, as well as completing post-doctoral work there.

Fisch is known for his suggestion that lower-hybrid and other waves could be used to generate continuously and at low cost the toroidal current in a tokamak plasma. Once controversial, Fisch's theories of current generation were confirmed in tokamak experiments worldwide, including, in the early 1980's, a particularly significant series of experiments on the PLT tokamak (Princeton Large Torus) at PPPL. Fisch was granted four patents on various ways of generating currents in tokamaks, and designs for economical fusion reactors generally now incorporate some means of generating steady-state current.

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# Stix Honored

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dent in the mid-1960's. I can think of no more deserving recipient of the University's Distinguished Teaching Award than Tom Stix. This award brings great honor both to Tom and to the Graduate Program which he was so instrumental in establishing and nurturing."

Stix was one of two senior faculty members to receive this first-time award, which included a certificate and a check for \$2,500. Two junior faculty members were also recognized.

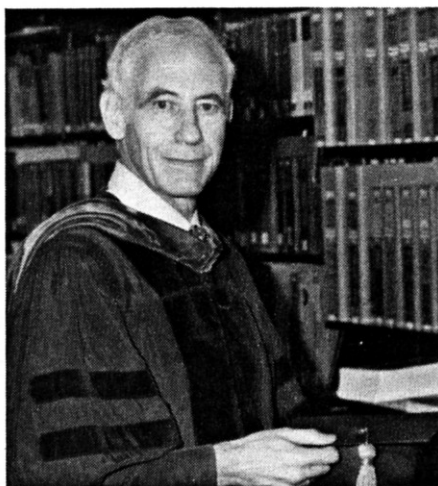
When receiving the award, Stix noted that he was accepting it not only for himself, but as a representative of the faculty for Princeton's Graduate School and of the Plasma Physics Section of the Department of Astrophysical Sciences. Said Stix, "Princeton has an outstanding graduate program in plasma physics, and I take this as an opportunity to recognize the superb teachers and graduate students that we have." Stix, now the most senior scientific staff member at PPPL, joined the Lab in 1953, after completing his Ph.D. in Physics at Princeton. He had received his B.S. from the California Institute of Technology in 1948. Over the years, he has served as Head and Co-Head of the Experimental Division and Head of the Basic Plasma Physics Group.

A member of the original Project Matterhorn team assembled by Professor Lyman Spitzer, Jr., Stix started his plasma physics career as a full-time experimentalist. Since then, in addition to many articles, he has published the book *The Theory of Plasma Waves*, 1962, and is now completing his second book on the subject, *Waves in Plasmas*, due out this year.

## Teaching Plasma Physics

Dr. Stix remembers, "The teaching program for plasma physics began in 1959, when I taught the first course on waves in plasmas through the Department of Electrical Engineering. In 1961, a separate graduate program was established, with four tenured professors: Edward A. Frieman, Melvin B. Gottlieb, Martin D. Kruskal, and myself. Since then, the number of doctoral degrees awarded in our program has grown to more than 140."

Fourth-year graduate student Bill Dorland has been very pleased with the support he has received



*Professor Thomas H. Stix dressed in academic regalia in preparation for Princeton's Opening Exercises on September 15, when he received the first Annual Award for Distinguished Teaching.*

Photo: Denise Applewhite

from Dr. Stix. "He's really been like a father figure for all of us, and I've appreciated his flexible approach to what a graduate school experience should be. Students come to the Plasma Physics Program with a wide variety of backgrounds, and it's difficult to meet all their needs, but Tom has made that possible."

Barbara Sarfaty, Administrative Assistant in the Graduate Studies Office, says, "Tom has made working in Graduate Studies an exciting and challenging experience.

It's clear that he loves the Program and has dedicated himself to it. His door has always been open, and students have felt very comfortable talking with him. He wants the program to flourish so that young scientists entering the workforce will have the best training possible."

## Scientific Contributions

During his career, Stix has made significant contributions in the areas of plasma waves and radio-frequency heating. Much of today's highly successful utilization of ICRF (ion cyclotron range of frequencies) plasma heating finds its origins in Stix' early experiments and calculations. Other areas in which he pioneered include: the first divertor experiments (1956); the first US tokamak-geometry experiments (1957); theoretical work on plasma-wave mode conversion (1965); magnetoelectric plasma confinement (1970), plasma heating by intense neutral-beam injection (1972), and magnetic stochasticity and enhanced heat transport (1973-78). He has also worked on the problems of ozone depletion and greenhouse warming.

Stix, who has been listed in *Who's Who in America* since 1965, has been active in professional societies, and received recognition in numerous ways. He served as Chairman for the American Physical Society Division of Plasma Physics in 1962-63, was a John Simon Guggenheim Memorial Foundation Fellow during his 1969-70 sabbatical year at the Weismann Institute of Science, and was awarded the 1980 James Clerk Maxwell Prize in Plasma Physics by the American Physical Society for his work on waves in plasma and on radio frequency heating. He has also served as associate editor for several physics journals as a member of the APS Panel on Public Affairs, and in 1985 chaired the APS Committee on the International Freedom of Scientists.

# Fisch to Direct Grad Studies

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Fisch is also known for his theoretical calculations of the conductivity and other fundamental quantities associated with an externally heated plasma. In 1985, together with Charles Karney, Fisch explained certain otherwise very puzzling experiments on PLT in which a very large fraction of wave energy had been converted to magnetic field energy.

In 1983, for the lay audience, Fisch wrote in *American Scientist*, "Pushing Particles with Waves." Fisch, a consultant to Exxon Research and Engineering since 1981, spent a sabbatical year at IBM, in 1986, as a Guggenheim Fellow, where he worked on machine learning. In the graduate program, he has taught *Irreversible Processes in Plasmas*, the last in the sequence of required graduate courses, and *General Plasma Physics I*, the introductory graduate course.

Says Fisch, "I'm fortunate to have inherited a top program. I will work hard to preserve and improve it. I would like to distinguish, however, the privilege of inheriting a great program from the achievement of building a great program. The building was accomplished by Tom Stix."

Stix, who has directed the graduate program since 1970, is leaving the post to pursue research and writing.

Fisch adds, "PPPL is the leading U.S. research institution in magnetic confinement of plasma. We're able to recruit excellent students because we have the greatest concentration of top scientists and the leading tokamak facility in the United States. Greatly attractive to students also is the faculty responsible for the teaching program, who are world renowned for their classic textbooks and research papers in the field of plasma physics."

"The Graduate Program, although in personnel a relatively small part of

PPPL, carries an immensely important cultural influence to the Lab. Seasoned researchers are surely excited by new discoveries, but the presence of young minds greatly enhances that excitement," notes Fisch.

## Diverse Possibilities

Fisch sees a primary challenge of the Graduate Program as anticipating trends so that graduate students can be guided effectively. He observes, "Since our ability to predict trends is limited, we need to teach general skills that can be used to work on a wide variety of problems."

Fisch adds, "We want the skills that students learn now to serve them well ten years hence. Some students will concentrate on mathematical and numerical skills, while others will concentrate on experimental techniques. We want students to be aware of the diversity of possibilities in applying these skills—in fields ranging from fusion to lasers, from plasma processing and plasma propulsion to astrophysics."

Fisch notes, "In this regard, strengthening ties with other University Programs will be beneficial. At the same time, it will be equally beneficial to strengthen ties between the Graduate Program and the main Laboratory Program; The Laboratory Program is now entering an exciting and telling phase, as we solve the problems of burning plasmas and construct tokamak reactors."

## The Plasma Physics Program

About 40 graduate students are presently enrolled in the Plasma Physics Program, with seven or eight students admitted yearly. The first two years students take general physics courses, most on main campus. During the first year, they complete an experimental project and pass prelims. During year two, students com-

plete a theory project and then pass generals. During years three through five, they complete a thesis.

Fisch notes that a major advantage of graduate studies at PPPL is that students are free to pursue projects with any of the 120 staff members who hold Ph.Ds—in contrast with some programs where students are chosen on a grant basis to work exclusively on a specific project.

One-hundred and forty-seven students have received doctorates since the inception of graduate studies in plasma physics in 1959. Says Fisch, "Students who graduate from here typically do very well—finding employment in industry, in national laboratories, and in academia. It is, in fact, a source of great pride to us that for three decades the graduate program at Princeton has provided for the field of plasma physics a disproportionately large number of its scientific leaders."

## HOTLINE

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# What's Happening at PPPL?

## Kids Invited to Do Poster or Essay for Lab's 40th

Children of PPPL employees as well as all other students in grades four through twelve are invited to create a poster or essay for the Lab's 40th Anniversary Celebration.

The poster or essay should express the creator's thoughts on the question "*Considering the environmental and political stresses that present energy sources place on our planet, what do you think will provide the energy required for the world's homes and industries during your lifetime and beyond?*"

A \$50 US Savings Bond is the prize for the winning poster and winning essay in each category: Grades 4-6, 7-9, and 10-12. In addition, participants will receive a certificate and entries will be displayed at the PPPL 40th Anniversary Community Open House, to which the public is invited on Saturday, October 26, 1991.

Entries must be submitted with a cover sheet stating: entrant's name, address, phone number, school, teacher, and grade. Essays must be 500 words or less, and entries from grades 10-12 must be typewritten. Submit entries by Thursday, October 3, to the Science Education Program Office, Room B137, LOB.

### Judges Needed

Says Robert Redding, who is coordinating the contest, "We have sent invitations to participate to 200 area schools, and we expect a big response, so everyone who enters should consider the competition and do their very best!"

He adds, "We need good judges, and we are looking for volunteers from the Lab. Please call me at 2107 if you can help."

## Weird Science to Invade Lab

Get ready for some fun! Three "weird science" teachers are coming to PPPL. The three, who have appeared on "Late Night with David Letterman," are Dwayne Lieneman, Bob Lewis, and Bill West, who teach in suburban Chicago schools.

On Friday, September 27, at 2 PM, they will present "Talking to Kids about Science." On Saturday, September 28, at 10 AM, they will present the **Weird Science Show**.

Says Robert Redding, who is coordinating the visit for PPPL's Science Education Program, "These presentations are especially for those who teach science to kids, and we encourage all the Lab scientists and engineers who visit schools as well as interested parents who are on staff to come. Children will also enjoy the Weird Science Show on Saturday."

Participants in the Teacher Research Associates Program (TRAC) and the Summer Teachers' Institute, both sponsored by the Science Education Program here, will be returning to the Lab for these programs.

To attend, please make a reservation. Be sure to identify yourself as a PPPL employee. Call Robert Redding at the Science Education Program Office, ext. 2107.

*Ray Jeanes (left), an Air Force pilot of C-5 transport planes, and Bert Allen (center), a Marine Sergeant in artillery, received recognition for their service during Operation Desert Shield/Desert Storm. In a ceremony on September 5, Milton Johnson (right), Manager of the Princeton Area Office, presented them a certificate signed by Secretary of Energy James D. Watkins and a medal "...in token of appreciation for the sacrifices made by you in behalf of our country." Ray Jeanes, a Fire Protection Engineer at PPPL, flew large equipment, such as tanks and helicopters, between the United States and the Middle East. Bert Allen, of the Lab's Emergency Services Unit, was part of a Marine Battalion sent to Okinawa to replace troops sent to Saudi Arabia. The battalion was on standby to move to combat positions in the Middle East when the war ended.*

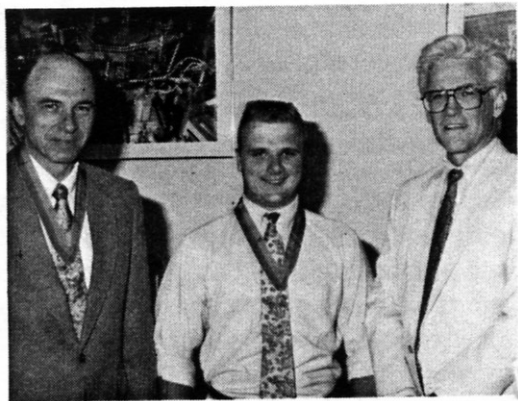


Photo: Denise Applewhite

# Annual Tennis Tournament Slated

Time to enjoy the high energy that brisk fall weather brings, and play some tennis! Hiro Takahashi, who founded and has organized the Melvin B. Gottlieb Tennis Tournament for most of the last 14 years, says, "We encourage everyone who's interested to play—employees, spouses and children alike—as long as they are recreational players. The competition is friendly and not very serious, and we have both A and B Divisions, so everyone can play with someone at their own level."

Come on out for the two initial rounds on Saturday and Sunday September 21 and 22 to be held at the Pagoda courts next to Baker Skating Rink on Princeton's main campus.

Winners of the initial rounds will be placed in A Division, and everyone else will join B Division. Everyone gets to play at least two matches. After the initial rounds, contestants arrange their own times to play.

If you're not a tennis player, you can enjoy the competition as a spectator as contestants vie for first and



Photo: Denise Applewhite

**Winners of the 1990 M.B. Gottlieb Tennis Tournament are shown here with their trophies. Left to right, they are: Division A winner Hiro Takahashi, a Research Physicist for PBX-M; Division B runner-up Janet Roberts, of the Diagnostics Division; and Division A runner-up Jim Bialek, from Engineering Analysis. Division B winner Mark Bannister (not shown), is a graduate student at PPPL.**

second place prizes in both divisions. More than thirty contestants typically turn out, so there's plenty of opportunity to watch every level of play. We plan to hold finals on Saturday, October 20.

After the first year of the tournament, when Sandy Dreskin was the

overall winner, Hiro Takahashi and Jim Bialek have volleyed back and forth for first place. In 1991, will a new winner emerge from the ranks? Takahashi offers the challenge, saying, "We're looking for new, fresh champions to come on out and say 'Move over, I'm here!'"

## Oops, We Goofed!

In the photo of the Training Advisory Committee in HOTLINE 15, Steve Jardin was misidentified as Ned Sauthoff. Apologies to both.

**Training Specialist Brian Trombley consults with Summer Science Awards student Radha Venkat on a computer-based training application. (In HOTLINE 15, the wrong photo caption was included, misidentifying them as Boris Grek and Rajini Ramakrishnan. Apologies to all concerned.)**



## Ideas Needed

Got a hot tip for HOTLINE? Your story and photo ideas are what make your newsletter lively and relevant, so please call Carol Phillips at 2754 or fill out the coupon, and we'll work with you to get your idea in print.

Name \_\_\_\_\_

Extension \_\_\_\_\_

Story and/or photo idea \_\_\_\_\_

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## Volunteers Needed for Family Day

We need you to participate in celebrating the 40th Anniversary of the fusion effort at Princeton.

Our celebration will begin with a Family Day and Open House on Saturday, October 26. The event will run from 10 AM to 4 PM. Volunteers are needed from 9 AM to 5 PM to help serve food, hand out souvenirs, direct tours, etc. If you can participate for *two, three, four or more hours*, please complete this slip and return it to Peter Del Gandio in the Safety Office.



***Yes! I volunteer to help make the 40th Anniversary Family Day a great success. Please sign me up for:***

Number of Hours: \_\_\_\_\_

Morning \_\_\_\_\_ Afternoon \_\_\_\_\_ No Time Preference \_\_\_\_\_

Name: \_\_\_\_\_

Extension: \_\_\_\_\_ Home Phone: \_\_\_\_\_

Send to: Peter Del Gandio, Safety Office, D-Site

## Banquet Tickets On Sale

Get your tickets now for the gala 40th Anniversary Banquet on Thursday, October 31. Good company, delicious food, and a talk by well-known astronomer Carl Sagan promise to make this a very special evening.

All PPPL employees and their immediate families are invited. Tick-

ets are \$25 and are on sale in the LOB lobby daily between 11:30 and 1:00. *Last day of ticket sales is Friday, October 4.*

Thanks for your cooperation in buying tickets early, so that the best location can be chosen and food plans made.



### Promotion

**Cheryl Such** has been promoted to Manager of the Operations/Information Center. She was previously Staff Assistant in the Center.

### Retirement

**Charles Emerson**, a Technical Associate in Research who has been employed at PPPL since 1976, retired September 1.

### Obituary

**Richard D. Farley** died on September 1. He was Lead Engineer in AC Power and had been with the Lab since 1956. Contributions in his memory can be made to: Holy Angels Mission Society, c/o The Rev. Michael Walsh, 1733 S. Broad St., Trenton, New Jersey, 08610.

## CLASSIFIEDS

### For Sale

**Entertainment '92** discount books with 50% reductions on restaurants, stores, movies, etc in Central Jersey. Still only \$35. Books now available for pickup. Call Greg at 3370.

**Honda Accord LXI**—white; four doors; power sun roof; AC; AM/FM stereo cassette; power antenna; cloth interior; \$8999. Call Don Greene at 3717.

**1968 Mercedes-Benz**—Model 230 Finback in excellent condition; 135,000 miles; \$5000. Call Eric after 6 PM at 609-921-7093.

### Computer Equipment:

- **Franklin Ace 500 Computer**—Apple IIC compatible with 256 KB RAM, 164 KB floppy disk drive; 90 keyboard serial and parallel ports;
- **Thompson 4120 RGB Monitor**—13 inch color monitor;
- **Laser FD 100CC Floppy Disk Drive**—external floppy disk drive 160 KB.

All computer items in excellent condition; good set up for home use/youngster to get started. Call Dai Kungl at 3002.