Princeton Plasma Physics Laboratory

Vol. 16, No. 18 • November 3, 1995

Hotline

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

Rutherford Retires

There's a brief summary on the life of Paul Rutherford in *Who's Who in America.* In quick phrases, it lists his personal history, educational degrees, professional titles, and awards.

A fuller reflection of Rutherford's life — richly detailed through anecdotes and laden with paeans to his professional accomplishments — was provided by his colleagues during a recent retirement party in his honor at Princeton's Prospect House. In October, Rutherford stepped down as PPPL's Associate Director for Research.

"Since 1965, Paul has served the University, the Plasma Physics Laboratory, and the national and international fusion effort with great distinction, and we are very grateful for his numerous contributions," said Laboratory Director Ronald C. Davidson.

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At his retirement reception, Paul Rutherford (left), talks to John Johnson (middle) and Laboratory founder Lyman Spitzer, Jr.

Goldston Named New Associate Director for Research

With an ear to the research staff and an eye on the future, Robert Goldston is taking on the duties of Associate Director for Research at PPPL. Goldston, Head of the Research Council and formerly Chief Scientist for the Tokamak Physics Experiment, replaces Paul Rutherford, who retired as Associate Director in October.

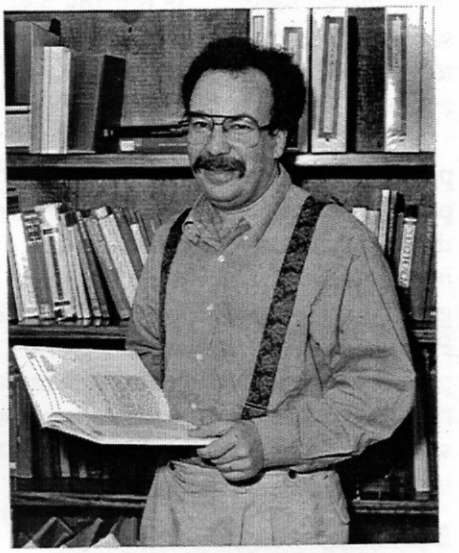
Said PPPL Director Ronald C. Davidson, "I am delighted that Professor Goldston has agreed to undertake this important responsibility, and look forward to working closely with Rob and the Laboratory staff in identifying the research priorities and opportunities for PPPL as the U.S. fusion program is restructured during the weeks and months ahead."

Challenging Times

Goldston said that during these challenging times of tightened budgets, he views TFTR as a "wonderful resource" for PPPL — a resource that can make major contributions to the world fusion program.

"The research staff, along with the engineering staff, has to work toward using TFTR to the greatest advantage for the world fusion program," said Goldston.

In the past, he added, there was always either a wind blowing from one side urging researchers to push for the highest possible plasma parameters or a counter wind blowing from the other side urging them to do only basic science.



Robert Goldston

"This is the first time the wind has been blowing from both directions, telling us to achieve high parameters *and* to do basic science," said Goldston. "So it's going to be especially challenging to keep a steady hand on the tiller in these changing winds."

That's where the Laboratory's best resource comes into play.

"A machine like TFTR can simultaneously push to the very highest parameters anyone has achieved in fusion and also do very beautiful science," said Goldston.

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Rutherford

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Davidson hosted the reception attended by PPPL's research staff and Council, as well as by all of the Laboratory's former directors — Lyman Spitzer, Jr., Melvin Gottlieb, and Harold Furth.

Those who offered their remarks about Rutherford — either in person or through letters — noted his "fairness," "brilliance," "statesmanship," "scientific and intellectual rigour," "honesty," and "impartiality and open-mindedness." The retiring Associate Director was even compared to a daredevil famed for his motorcycle leaps.

"Paul is the Evel Knivel of the plasma physics world! He has prepared extensively, worked hard on the challenge, and succeeded in making great leaps across challenging gaps among three careers," said Plasma Science and Technology Department Head Ned Sauthoff, referring to Rutherford's careers as research scientist, science administrator, and science statesman.

Brilliance as a Scientist

Newly appointed Associate Director for Research Robert Goldston cited Rutherford's "intellectual honesty," while TPX Project Director John Schmidt spoke of the retiring Associate Director's "brilliance as a scientist," frugality, and dedication to hard work. Schmidt illustrated the second attribute by noting the archaic computer Rutherford uses and by relating a humorous story that took place at Heathrow Airport in London. When he and Rutherford discovered they had first-class tickets on a return trip to the U.S., Rutherford ran to the counter, asking for economy-class seats.

PPPL Director Ronald C. Davidson (left) presents a photo of PPPL to Paul Rutherford.

"It's one of the few times Paul failed...and we did enjoy the chateaubriand," said Schmidt.

Rutherford's 30-year career at PPPL, where he served as Head of the Theoretical Division from 1974 to 1980 before becoming Associate Director, is marked by his involvement in the conceptual phase of TFTR, by his commitment to representing and nurturing the research staff — which he describes as the Lab's "principal asset" — and by his contributions to the International Thermonuclear Experimental Reactor (ITER).

As PPPL Deputy Director Dale Meade noted, "For the last two and a half decades, Paul has always been on the forefront of the next machine that will be built for experiments."

Rutherford presently serves as the Chairperson of the Technical Advisory Committee for the ITER Project, which he plans to devote most of his efforts toward while at the Lab through next September.

Indeed, there seems little time for "retiring" for Rutherford, the 1983 recipient of the E.O. Lawrence Memorial Award and the author of more than 80 research papers on theoretical aspects of magnetically confined plasmas. He said he plans to work "pretty much full time," concentrating on ITER responsibilities, continuing to co-teach an undergraduate plasma physics course at Princeton University, and "formulating some research ideas."

Push for Strengthening

And while signing off as Associate Director, Rutherford will continue to push for the strengthening of the research staff. "Despite the cutbacks, it is important to continue to look for promising new researchers," he said, explaining that students will not continue to enter the field of plasma physics if there are no opportunities on the horizon.

Rutherford's own interest in fusion was sparked while an undergraduate student at Cambridge University in England in 1958. Fusion had just been declassified, and physicists from the fusion program at the Harwell Laboratory in England began lecturing about their research at

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HOTLINE

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The HOTLINE is issued by the Princeton Plasma Physics Laboratory, a research facility supported by the United States Department of Energy. It is primarily an internal publication. Correspondence and requests to reprint material should be directed to the Editor, PPPL HOTLINE, P.O. Box 451, Princeton, NJ 08543; Interoffice correspondence should be addressed to Room B366, LOB Bldg., C-Site; fax 609-243-2751; telephone 609-243-2754; e-mail caphilli@pppl.gov

Rutherford

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universities. "As a student, it seemed to be a fun thing — the physics seemed both interesting scientifically and certainly potentially useful," he said.

Rutherford went on to receive a bachelor's in 1959 and a Ph.D. in 1963 in theoretical physics from Cambridge. After postdoctoral positions at PPPL and the Culham Laboratory in England, he returned to the United States to join PPPL in 1965.

Discussing fusion and his continuing commitment to the Thermonuclear Experimental Reactor Project, Rutherford described a painting, "Fasching und Fasten," by Peter Bruegel the elder, which is in Vienna's art museum. The painting depicts a small town the night on which Fasching, the season of merrymaking, ends, and Lent, the season of fasting, begins. In the town square is a somber group in black who have come to proclaim the start of Lent. Everywhere around them, people are hiding to prolong the merrymaking.

Enormous Fun

"Fusion surely finds itself in just such a situation. The past 30 to 40 years of fusion research — the phase in which plasma physics has been the dominant activity — have been enormous fun. Years filled time and time again with the exhilaration of fundamental scientific discovery," said Rutherford. "But we know now how to make a burning plasma, so let's do it. And in so doing, let us recognize that it is also time to turn to the serious and somber business of developing the engineering and the technology needed to make fusion energy practical."

He said many in the fusion program — like those in Bruegel's picture — will try to hide so they can continue the merrymaking.

"But in truth, for fusion also, the season of Fasching is over, and the season of Lent is at hand," said Rutherford. "So that's why I'm in ITER...The crowning moment for me will come in 1998 if ITER moves forward into construction, and if I can have done something, however small, to help bring that about." ●

Goldston

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Goldston, who graduated magna cum laude in physics from Harvard University in 1972 and received a Ph.D. in plasma physics at Princeton University in 1977, became interested in plasma physics while an undergraduate student at Harvard.

"It occurred to me that the special character of human beings is that we take in energy, and we create beauty. For instance, Bach eats a peanut butter and jelly sandwich in the morning and he writes a cantata in the afternoon," said Goldston. "So it seemed to me that accessing new, clean forms of energy so we could continue to do more and more beautiful things without spoiling our environment is what it's all about."

While in his junior year, Goldston switched to physics as a major, cross registering in plasma physics courses at the Massachusetts Institute of Technology since there were none available at Harvard. He went on to complete doctoral research at Princeton that involved both the theoretical and experimental work on plasma heating and diagnostics of tokamaks, remaining at PPPL as a member of the research staff. In 1984, he became a Principal Research Physicist and from 1983 to 1989, he headed the physics program division of the TFTR, during which time he received the American Physical Society's Prize for Excellence in Plasma Physics, along with Jim Strachan and Rich Hawryluk.

"In this complicated world we're in, we need everybody's energy and ideas for the best way PPPL can contribute to progress in fusion."
—Robert Goldston

In addition to his research work at PPPL, Goldston teaches the graduate experimental course in plasma physics and co-teaches, along with Rutherford, an undergraduate course in plasma physics. The two recently completed a textbook in plasma physics.

As a professor, Goldston is committed to communicating the excitement of plasma physics research, and the beauty of the underlying physics.

Open Door

And as the newly appointed Associate Director for Research, he is dedicated to providing an open door to the research staff.

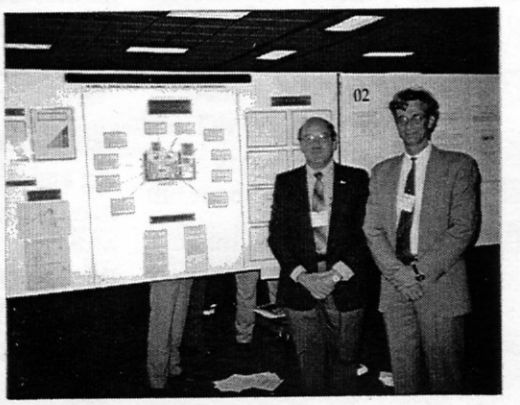
"I want to develop a means to improve communications and to be responsive to people's ideas," said Goldston, who sent an e-mail to the research staff asking for suggestions on how to improve communications. "I want people to feel that they 'own' the research program at the Laboratory, and are involved in its development, because their voices are heard in management decisions."

Goldston said the key for success is openness to new ideas and directions.

"In this complicated world, we need everybody's energy and ideas for the best way PPPL can contribute to progress in fusion," he said. ●

PPPL Engineers and Physicists Attend IEEE Symposium

Laboratory Group Meets Inventor of "TOKAMAK" Name



PPPL engineers and physicists attending the recent IEEE (Institute of Electrical and Electronic Engineers) Symposium on Fusion Engineering in Champaign, Illinois, got to meet and reminisce with Russian scientist Igor N. Golovin, shown seated third from the right in the above left photograph. Golovin is credited with inventing the Russian acronym TOKAMAK. Said PPPL Engineer Eugene Baker, "After taking the photograph, Dr. Golovin fielded many questions from us. He discussed his early experiments during the 1950s at the Physics Research Institute in Moscow. He lent a very interesting and historical perspective to these experiments on plasma heating and confinement in toroidal fields." According to Baker, Golovin said in 1953 he was requested to develop a name for a new plasma chamber with which he was working. He said he coined the name "tokamak" by taking the first syllables of the Russian words toroid-kamera-magnit and the first letter of the word katushka. Translated into English these words are toroid, chamber, magnet, and coil — "the toroidal chamber and magnetic coil."

In the above right photo, PPPL Engineers Eugene Baker and Charles Neumeyer are shown in front of one of the nearly 50 poster presentations made by PPPL'ers at the IEEE Symposium on Fusion Engineering. The symposium was attended by more than 400 members of the fusion community from throughout the world.