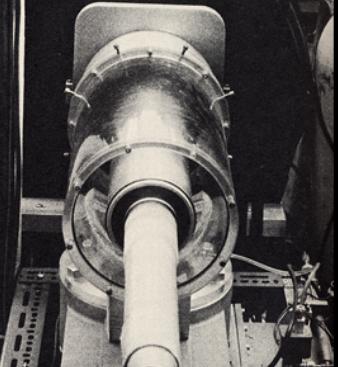
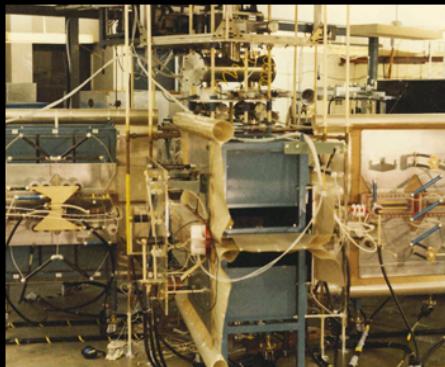
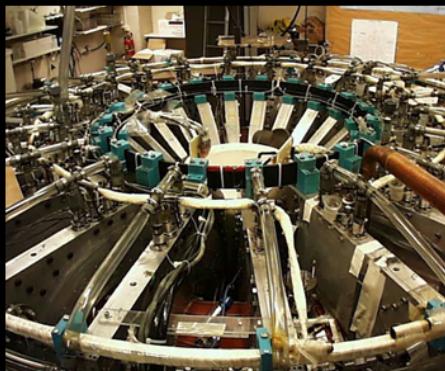
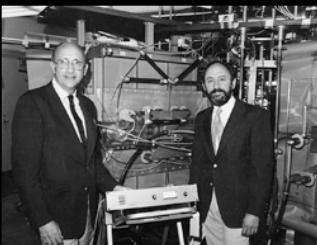
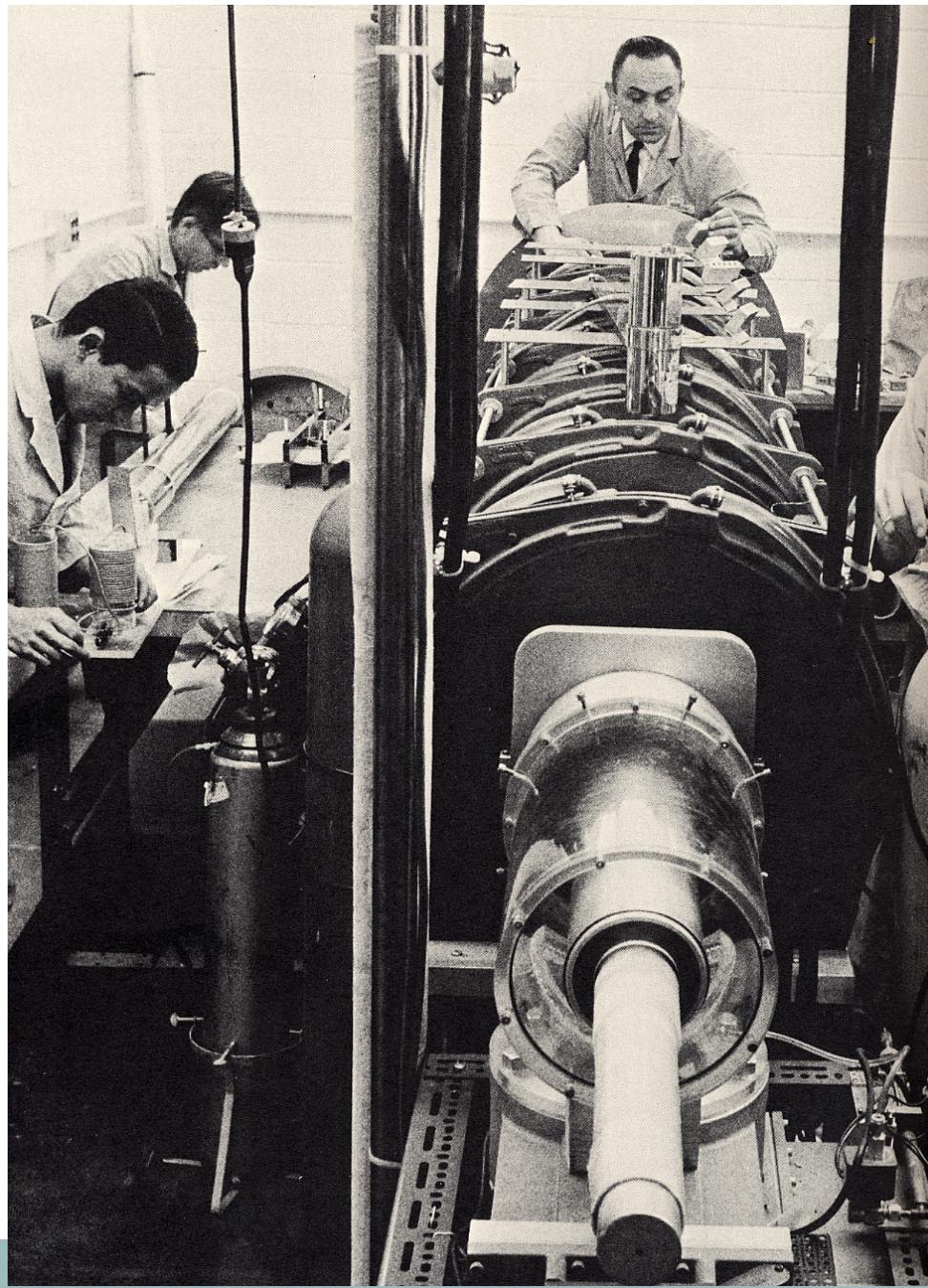


Plasma Physics Lab 50th Anniversary Celebration

Thursday, April 26, 2012





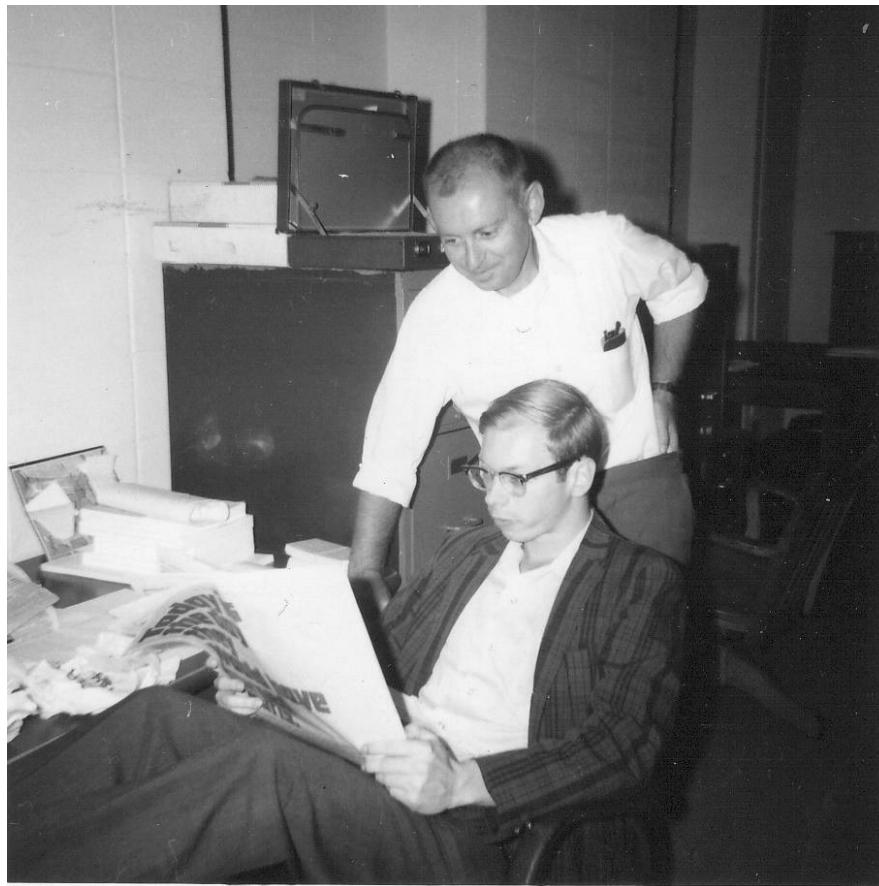


THE PLASMA LABORATORY

Left to right: Professors Marshall, Schlesinger, Turkott, Sagdeev (visiting from Russia), Gross.

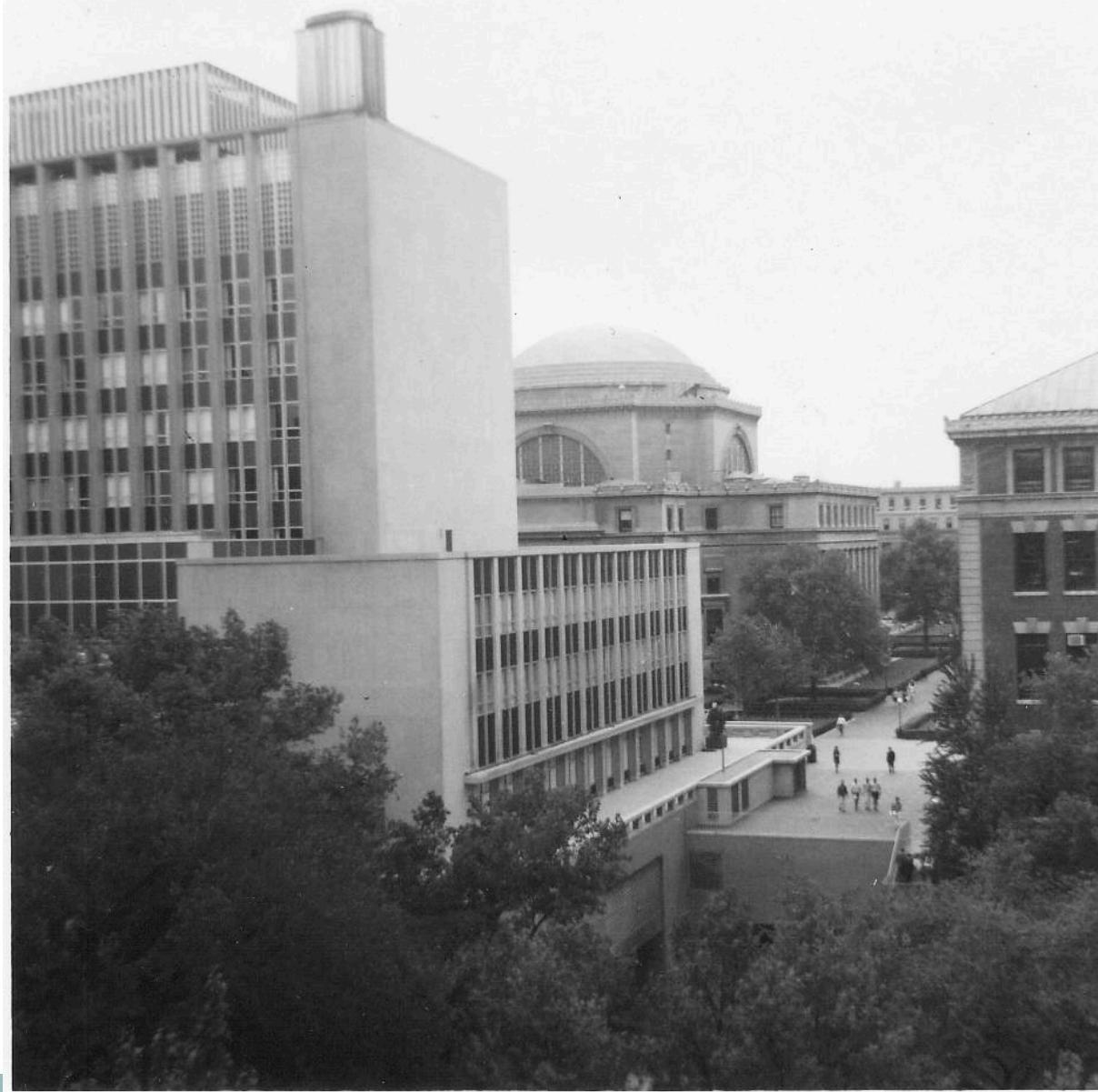


1965-1966





• SEP • 66





1965



1965-
1966

DOCTORATES
EARNED IN THE
PLASMA LABORATORY
OF
COLUMBIA UNIVERSITY

THEODORE E. LUZZI
1963
VICTOR L. GRANATSTEIN
1963
KWADWO O. KESSEY
1963
PAUL A. KOCH
1964
BERNARD J. EASTLUND
1964
BERTRAM PARISER
1964
ROBERT T. TAUSKIO
1965
BENNETT MILLER
1965
ROBIN O. MOTZ
1965
ROBERT F. LEHENY
1966
TUNG-GANN CHEN
1966
ANN L. FULLER
1966



1966



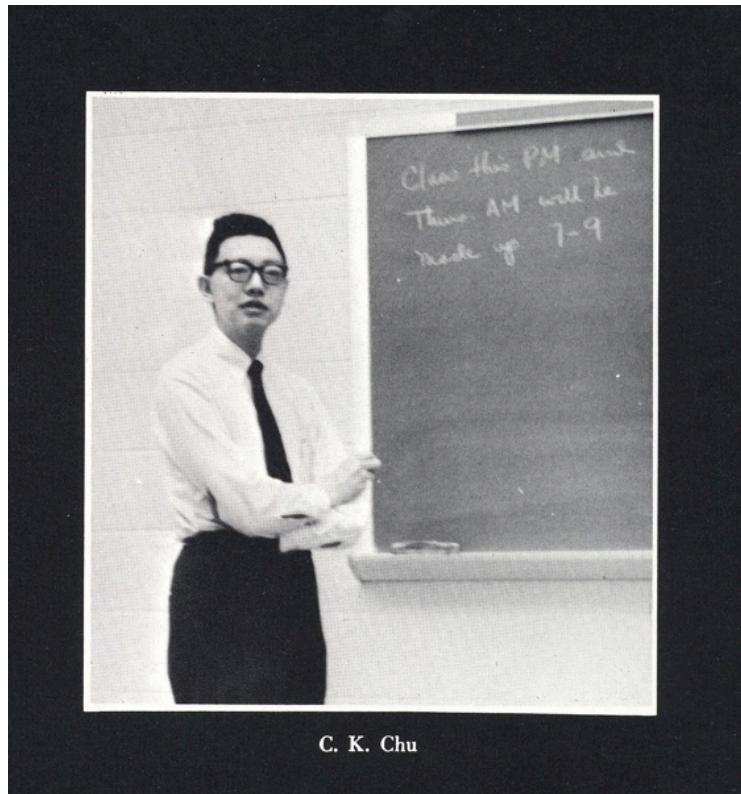
Günther
Tumm

June
Clearman

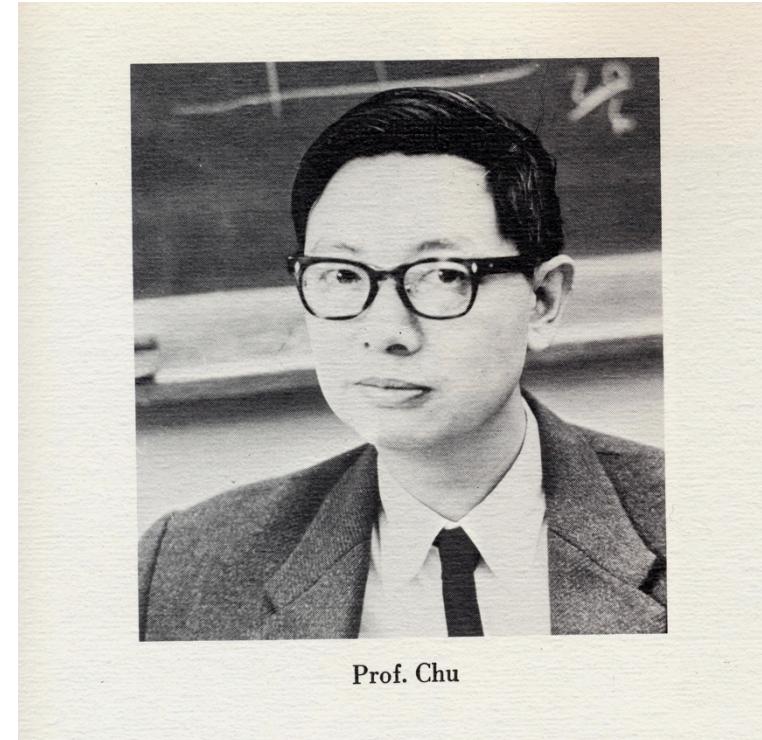
Werner
Hartl

Jack
Dorning

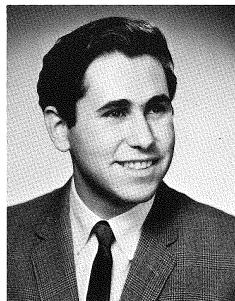
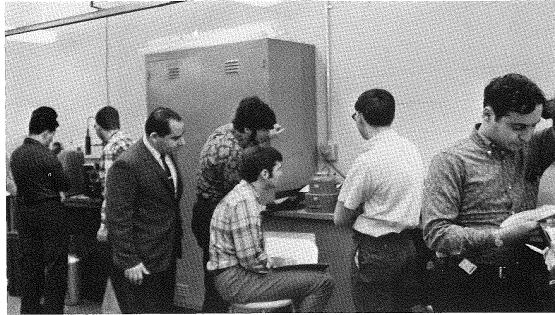
1966



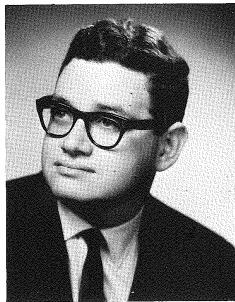
1967



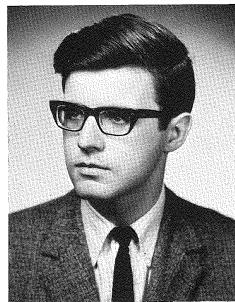
1968



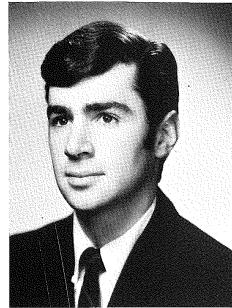
Stephen Ostrow



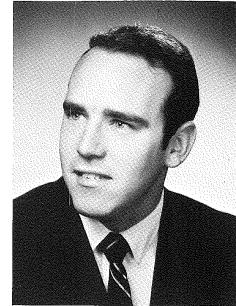
Harold Rothstein



Christos Sofes
Applied Physics



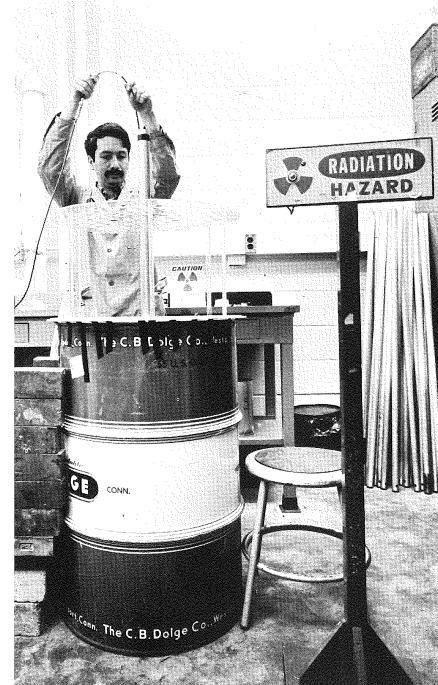
Edward Gerstenhaber



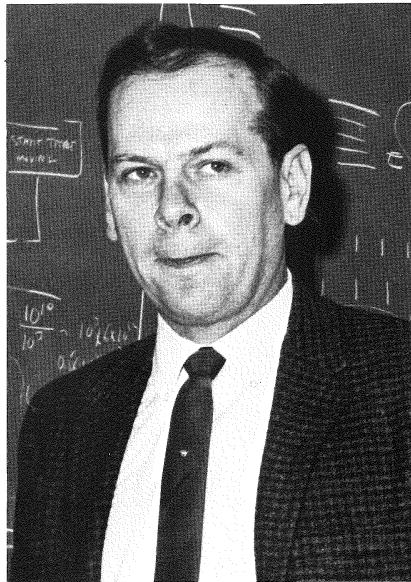
James Lyons



Michael Millner



1968



Prof. Lidofsky



Judy



Minna



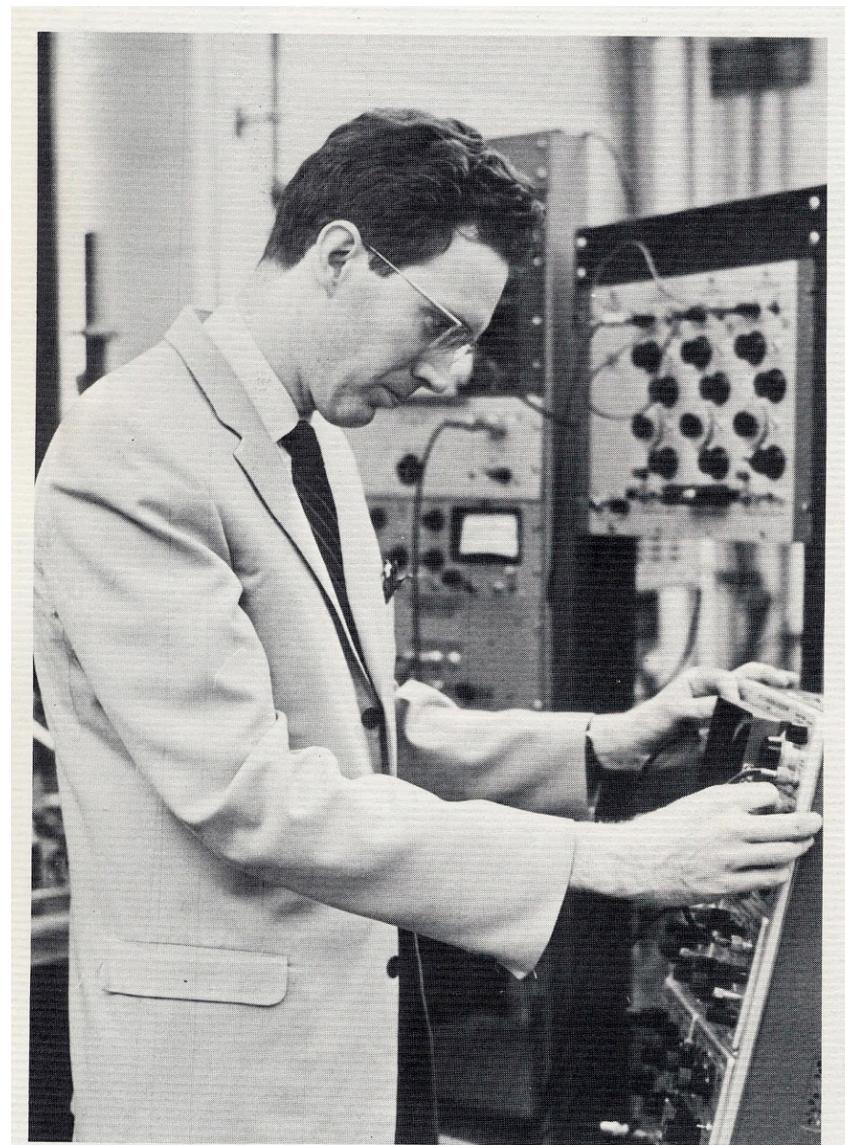
Prof. Melkonian

1968



Prof. Chu

1969



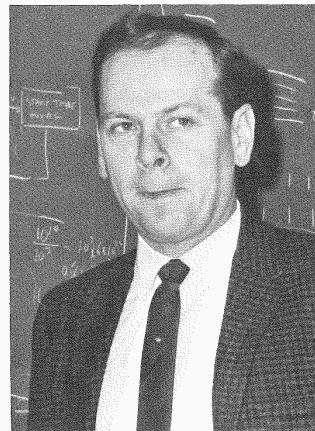
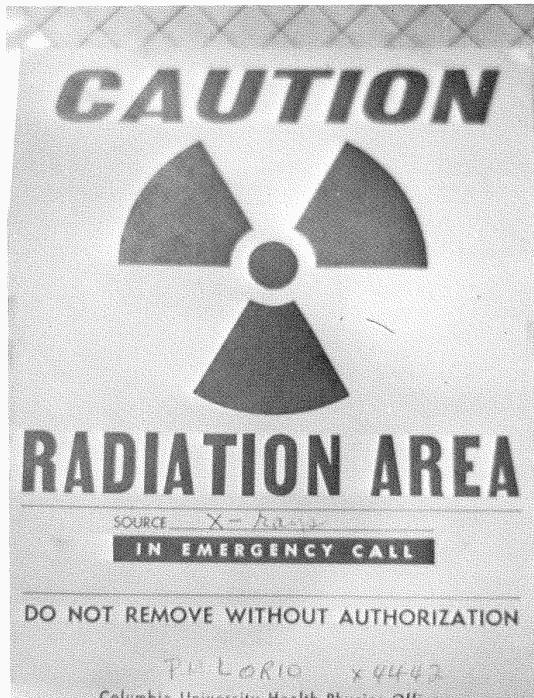
PROF. MARSHALL

1969

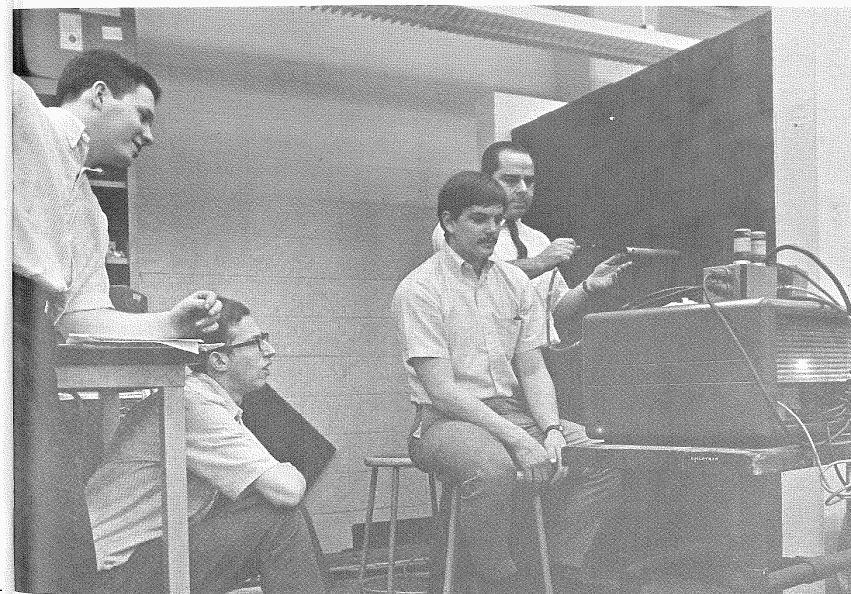
PROF. HAVENS



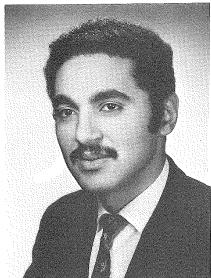
PROF. MELKONIAN



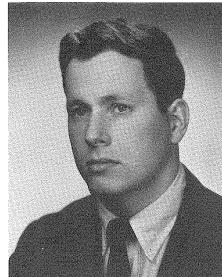
PROF. LIDOFSKY



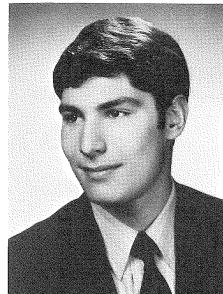
1969



FEISAL ABDUL-RAUF



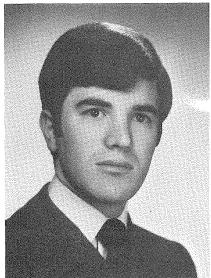
ROBERT N. CHERDACK



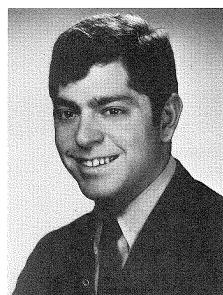
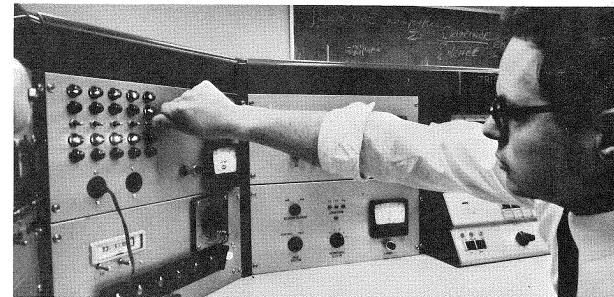
OWEN L. DEUTSCH



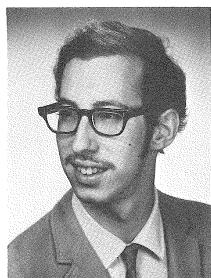
IRA FUCHS



JAMES COROMILAS



LAWRENCE GRANNIS

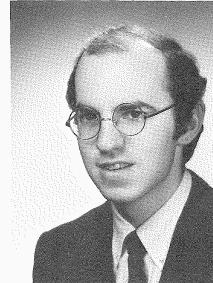


NATHAN DENKIN

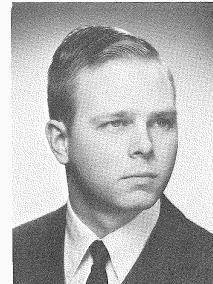


EDWARD HENDRICK

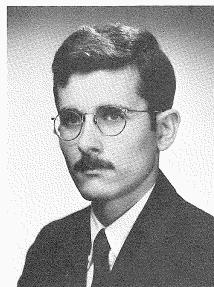
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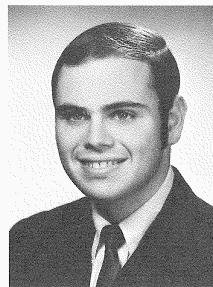
ANDREW KARP



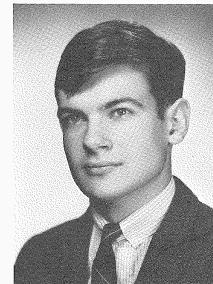
STEVEN LARSON



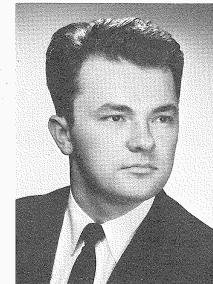
SAMUEL MIRANDA



NEIL A. PASSMAN



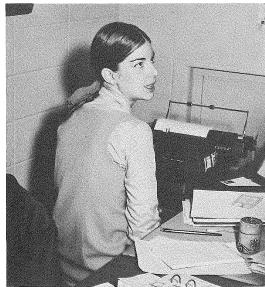
ANDREW J. SALTHOUSE



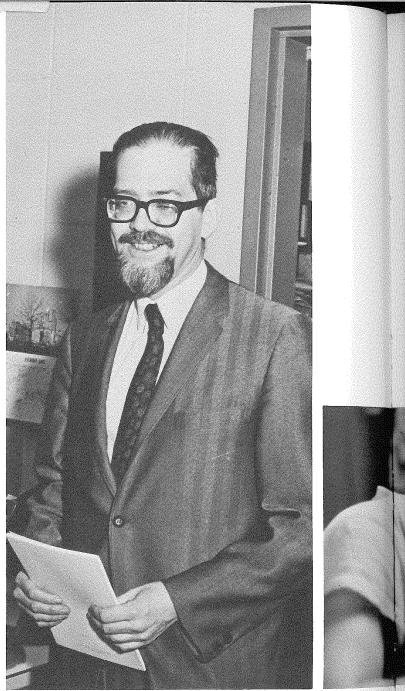
MICHAEL TODOSOW

1970

nuclear
engineering



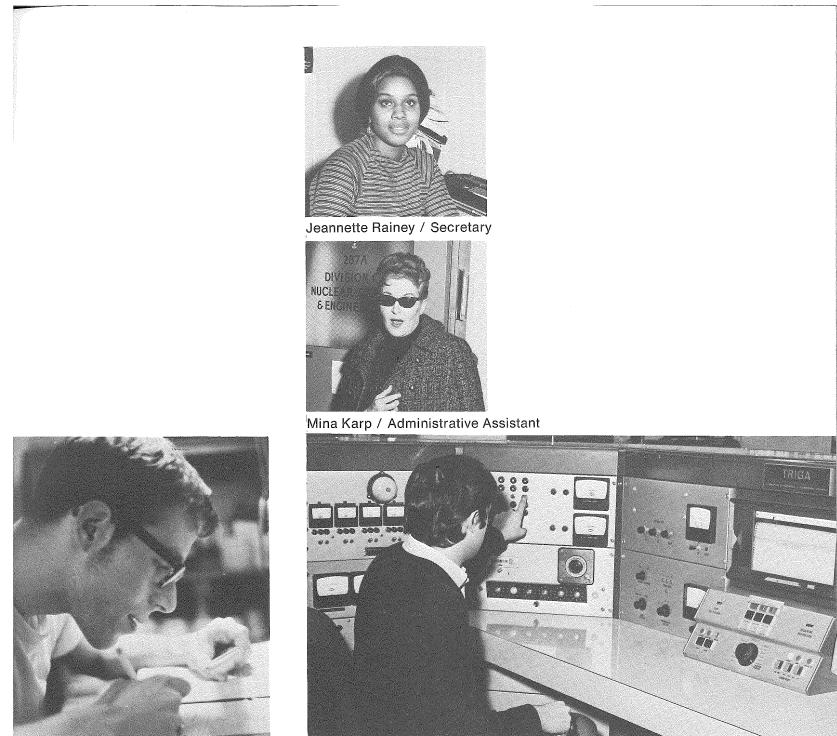
Ann Whitney / Administrative Assistant



Professor H. Goldstein



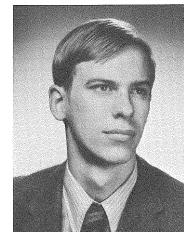
CAUTION



Jeannette Rainey / Secretary

Mina Karp / Administrative Assistant

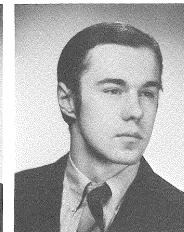
Controversial TRIGA



John Wallace

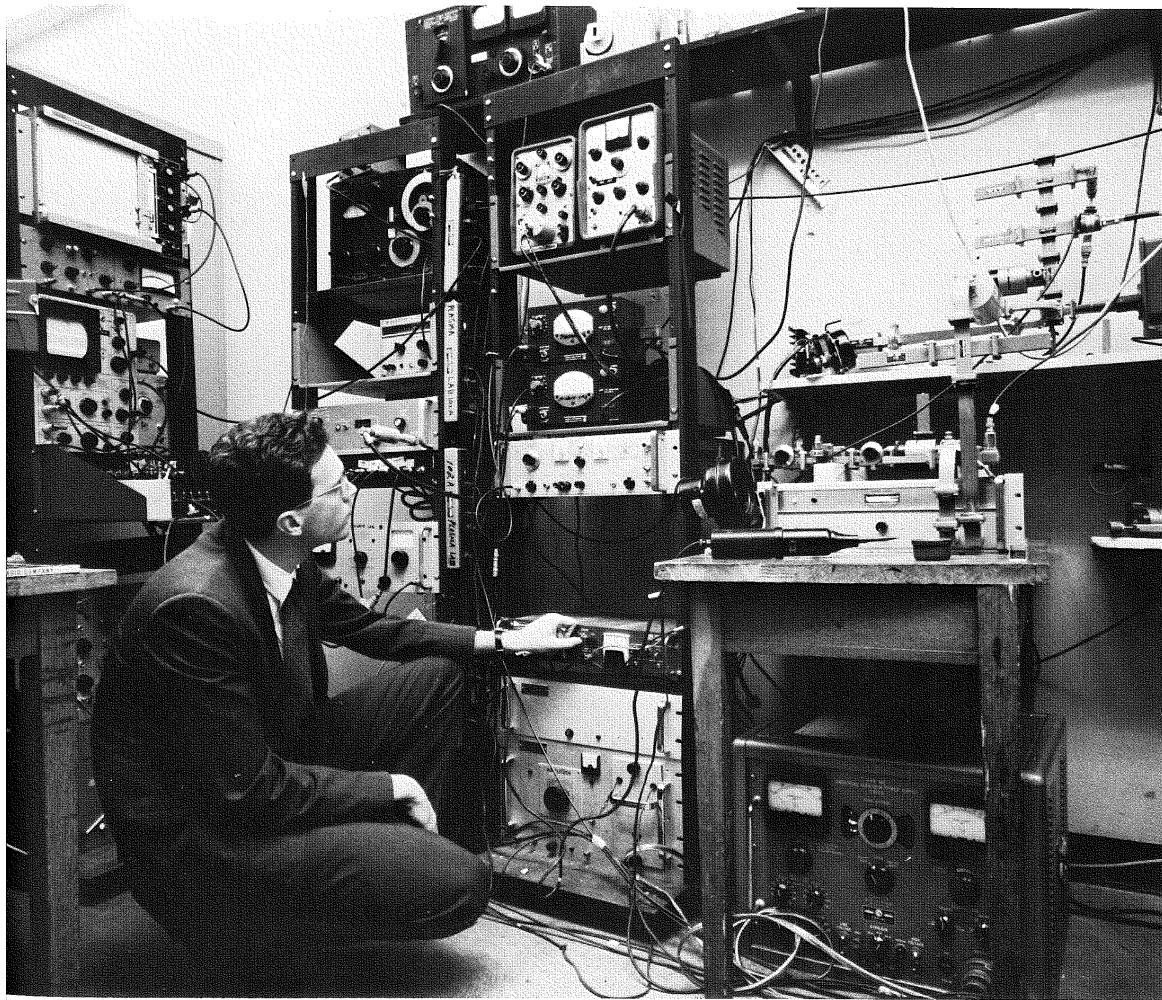


Michael Zestar



Edward Zima

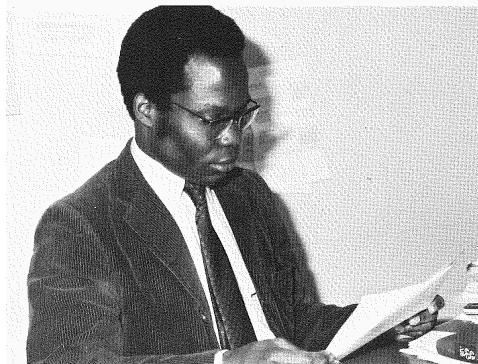
1971



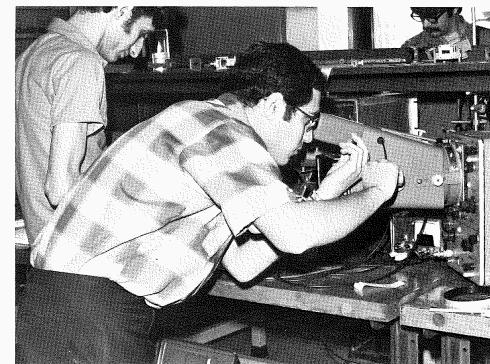
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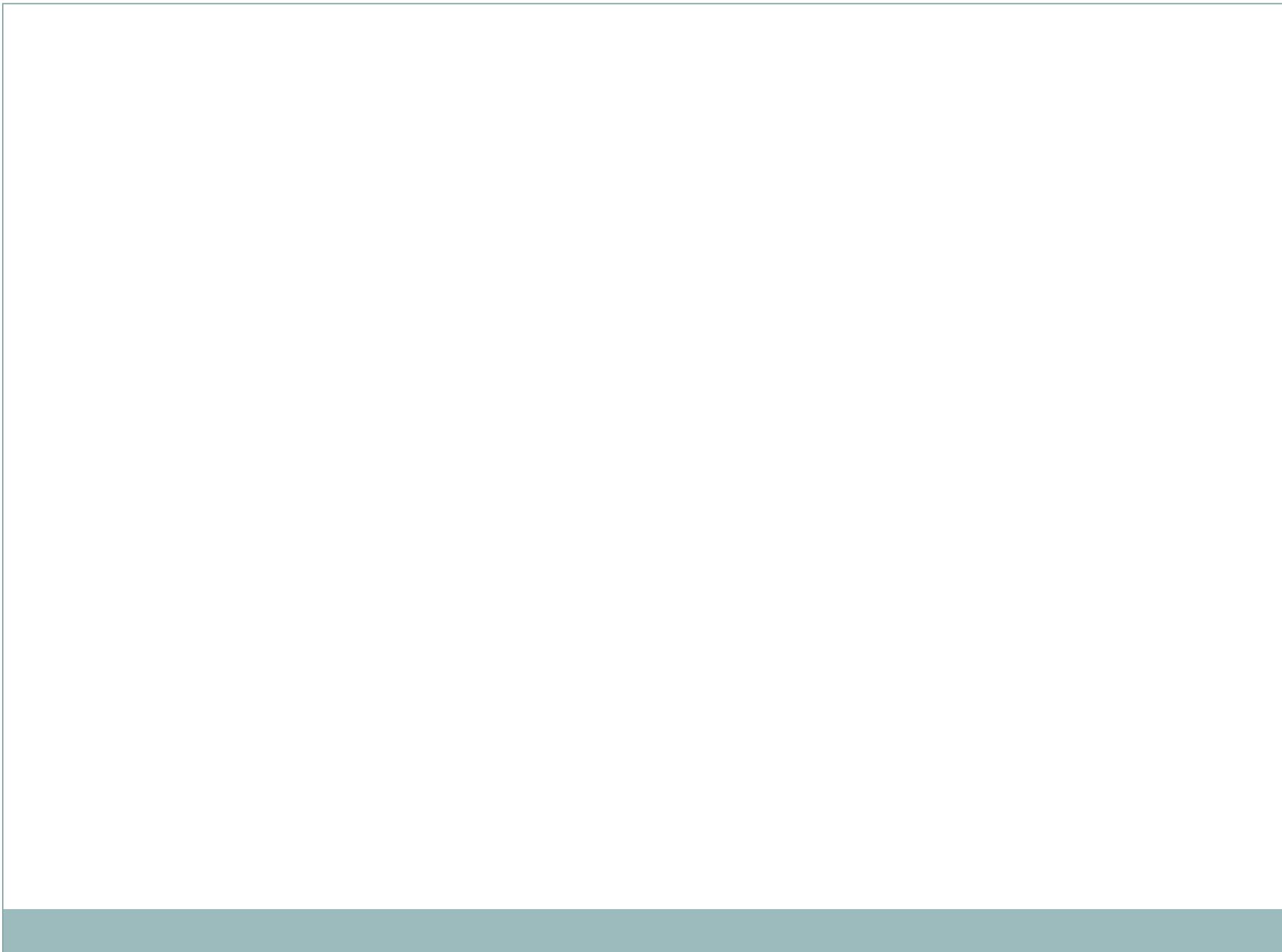


Professor T. Marshall

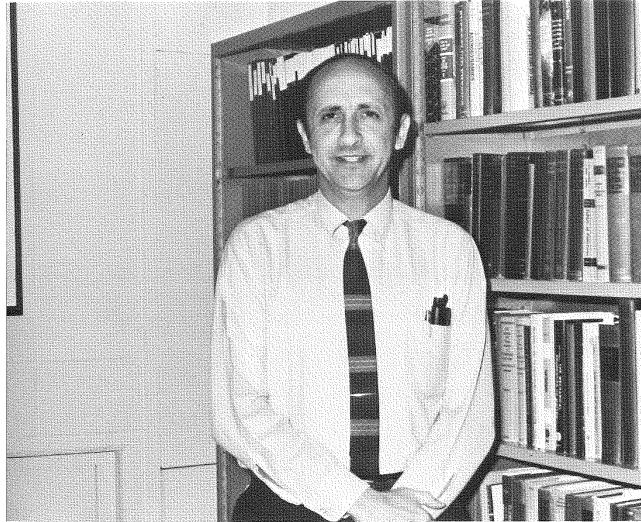


Professor J. Oso





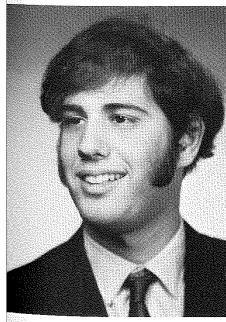
1971



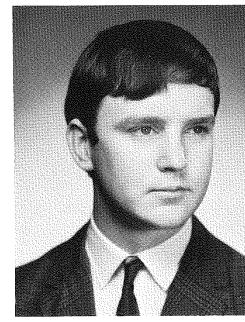
Professor R. Gross



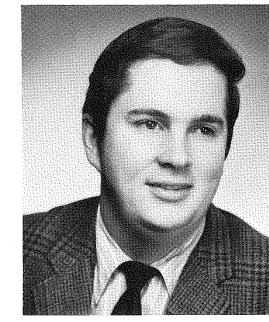
Professor F. Freudenstein



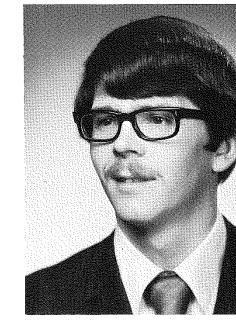
Michael Abramowitz



Thomas Dempsey

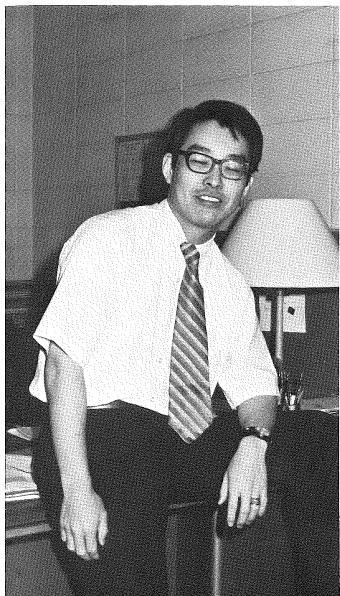


Terrence E. Donovan

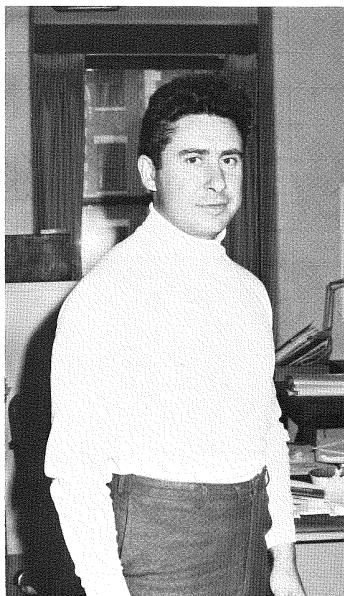


Rodney Gartner

1971



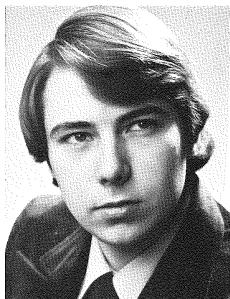
Professor G. Domoto



Professor V. Castelli



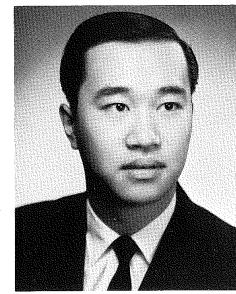
Nuclear Science
and Engineering



John Kittel



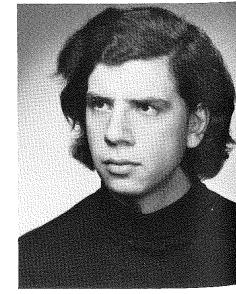
Professor C. Chu



David C. Hom



Sheldon Meth

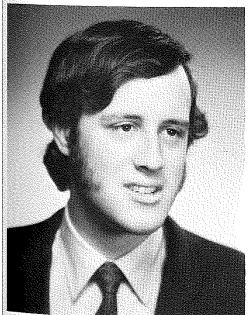


Pantelis Pechlivanides

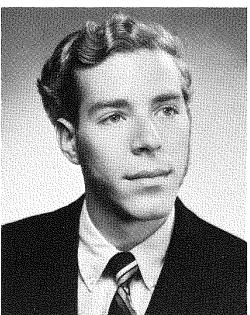
1971



Professor H. Goldstein



Samuel Talmadge



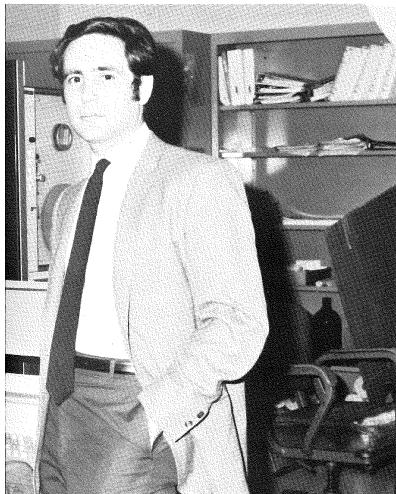
Albert Ugelow



Professor E. Melkonian



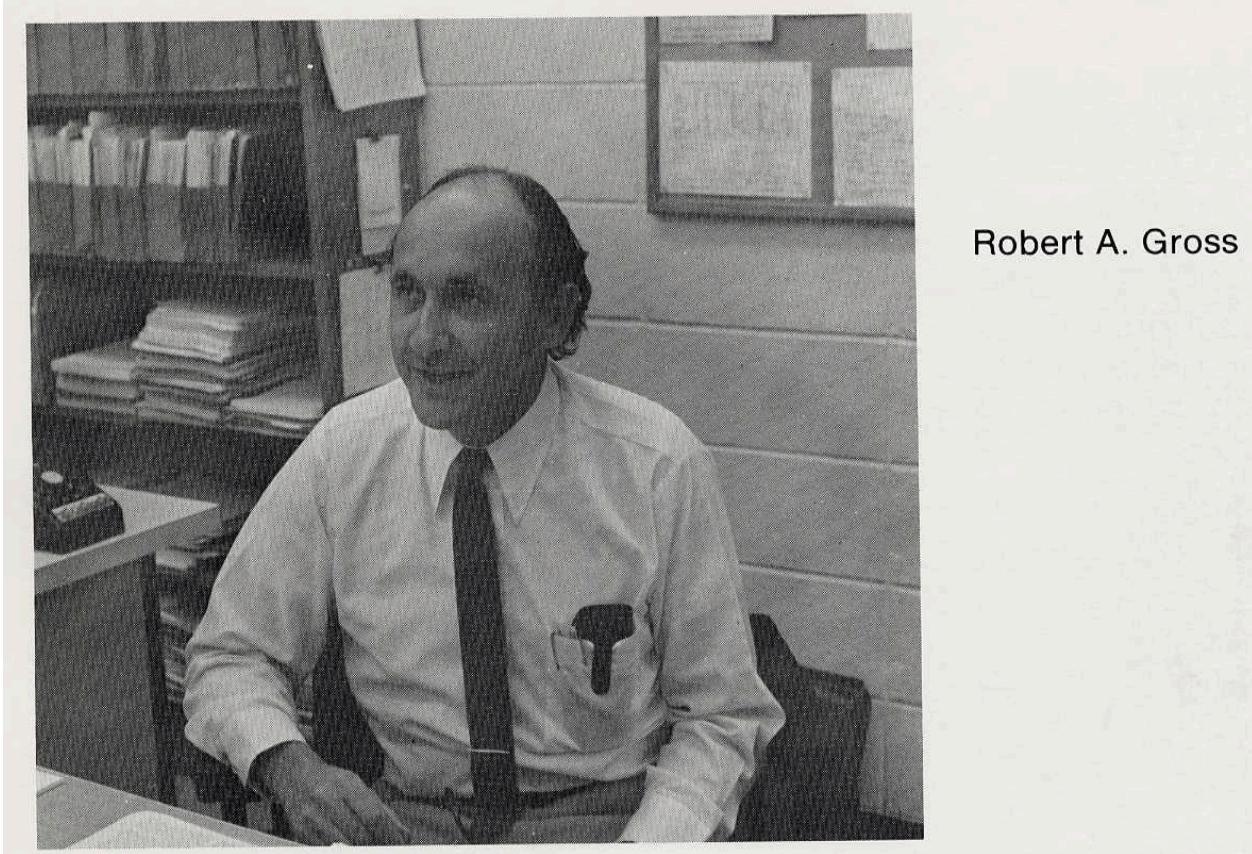
Professor L. J. Lidof



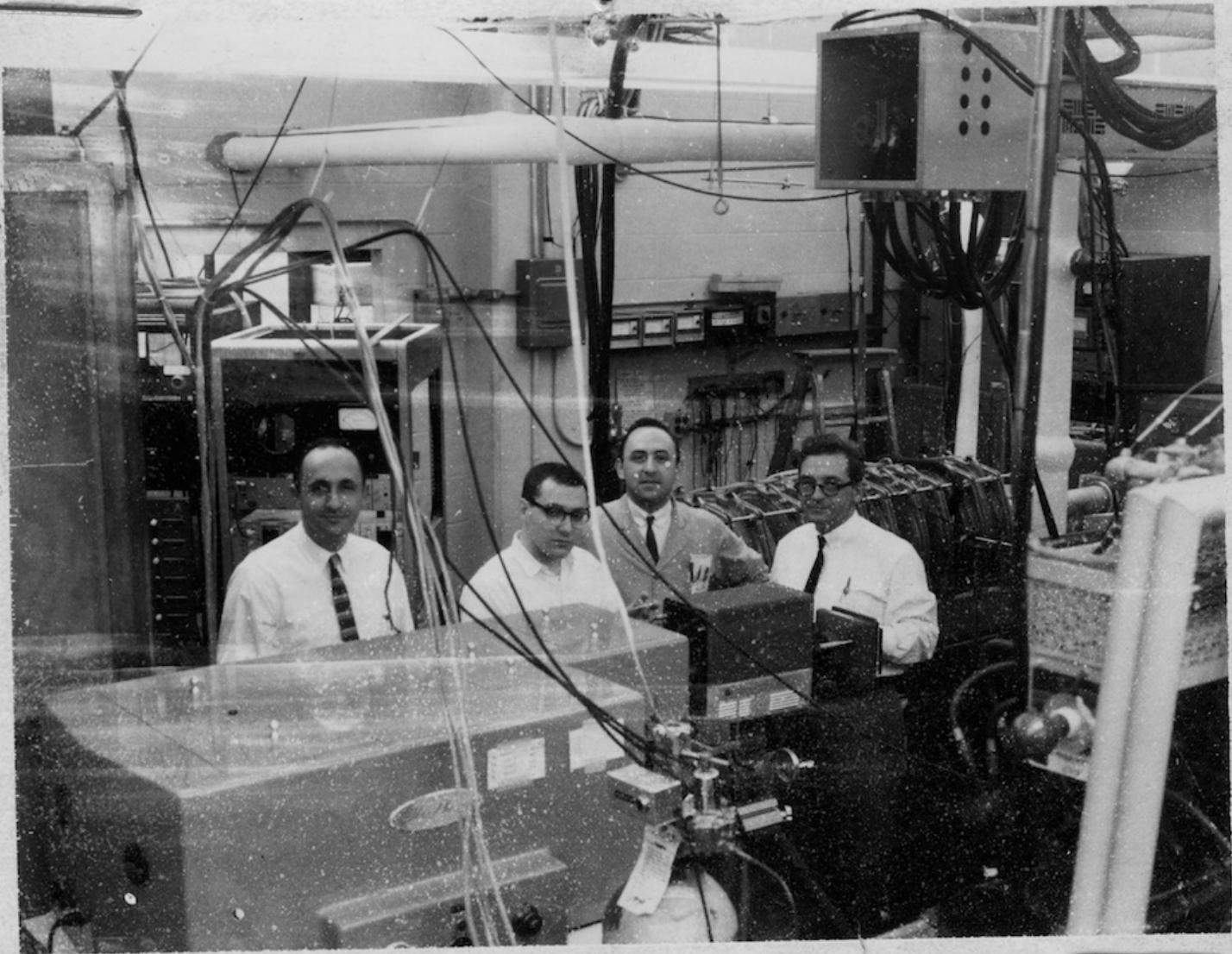
DaCruz / Secretary



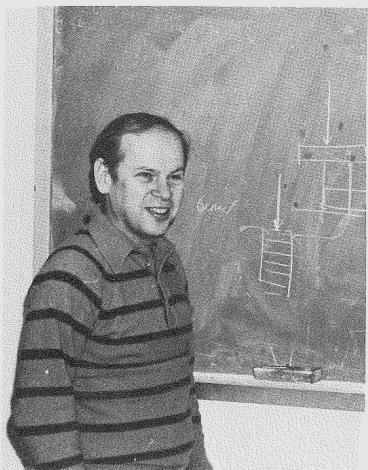
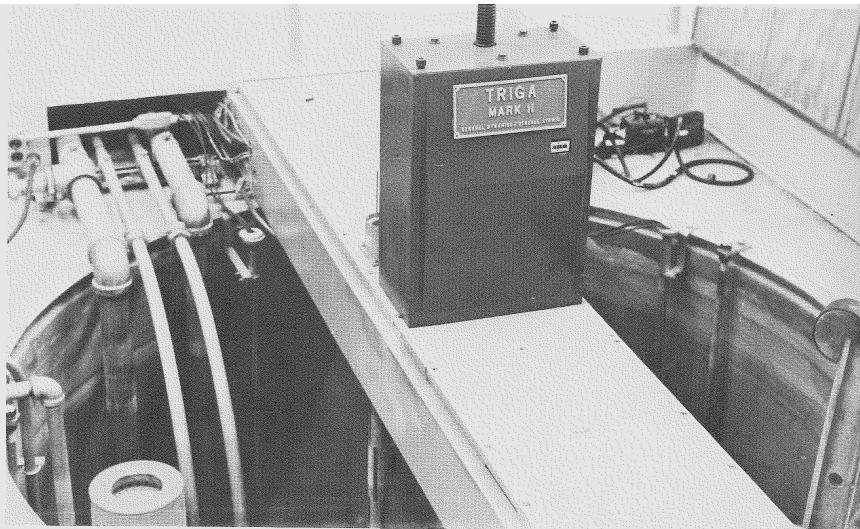
1972



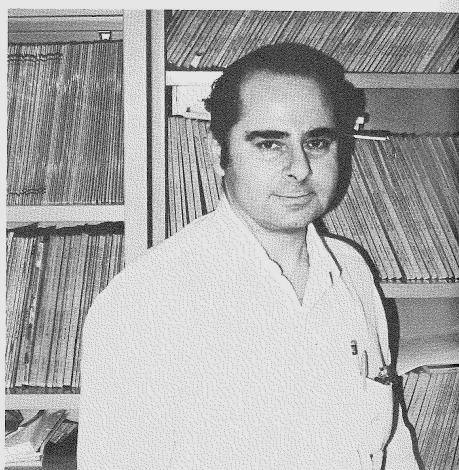
Robert A. Gross



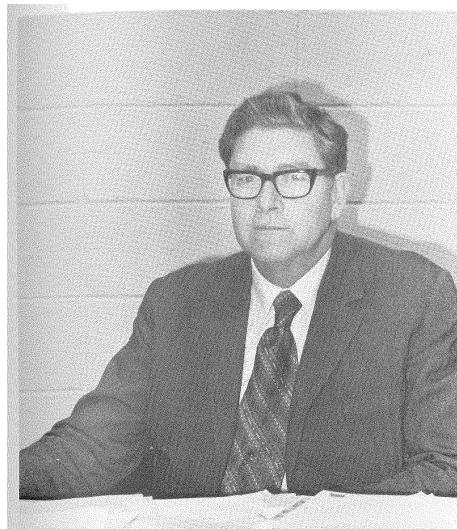
1974



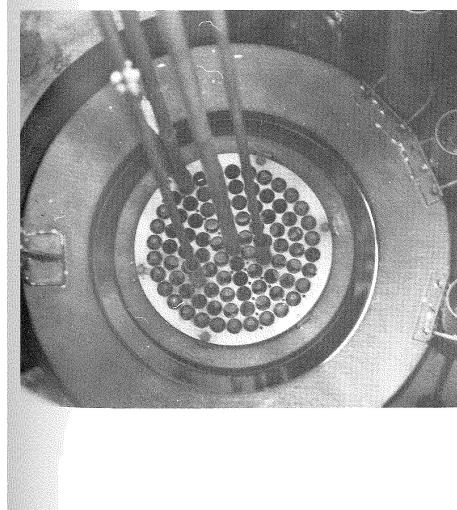
LEON LIDOFSKY



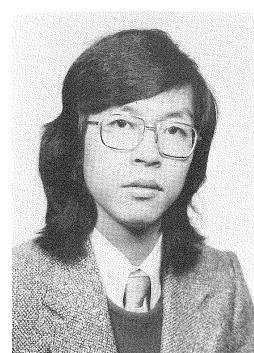
EDWARD MELKONIAN



WILLIAM HAVENS, JR.



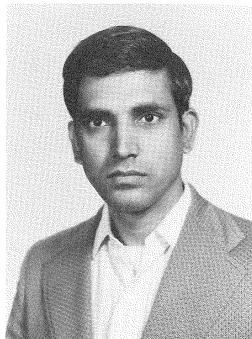
CHARLES BONILLA



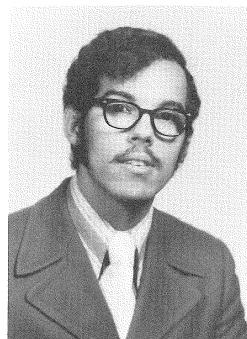
PAUL LEE



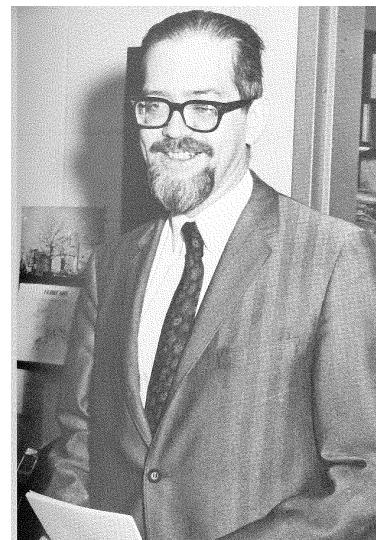
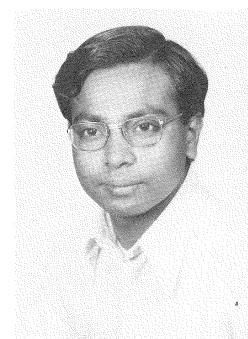
1974



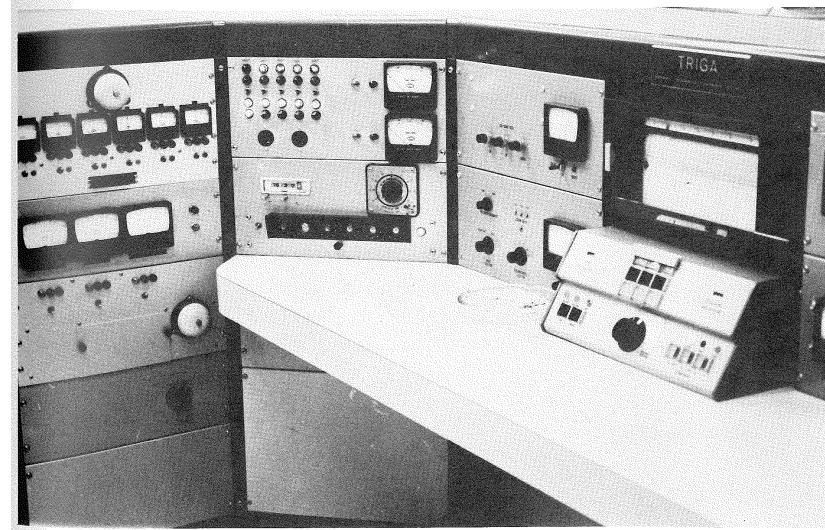
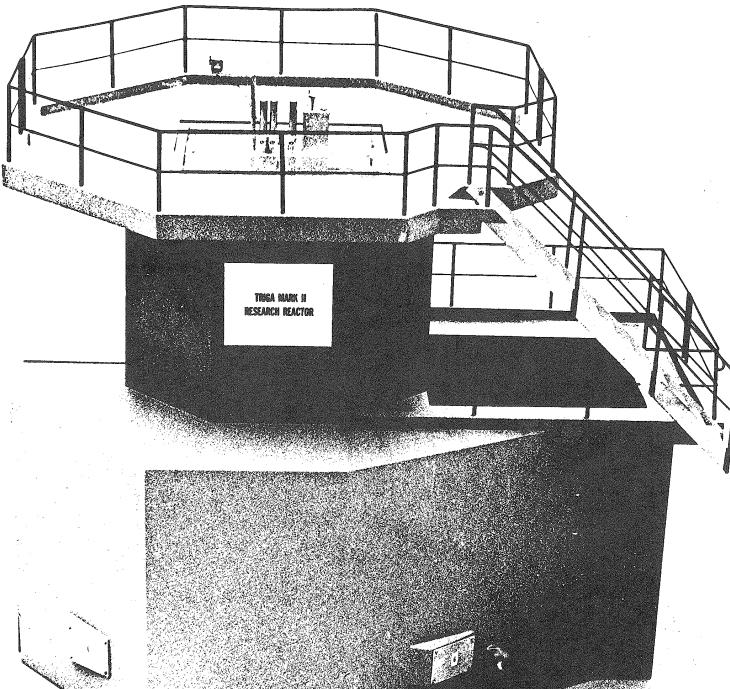
PERVEZ MIRZA

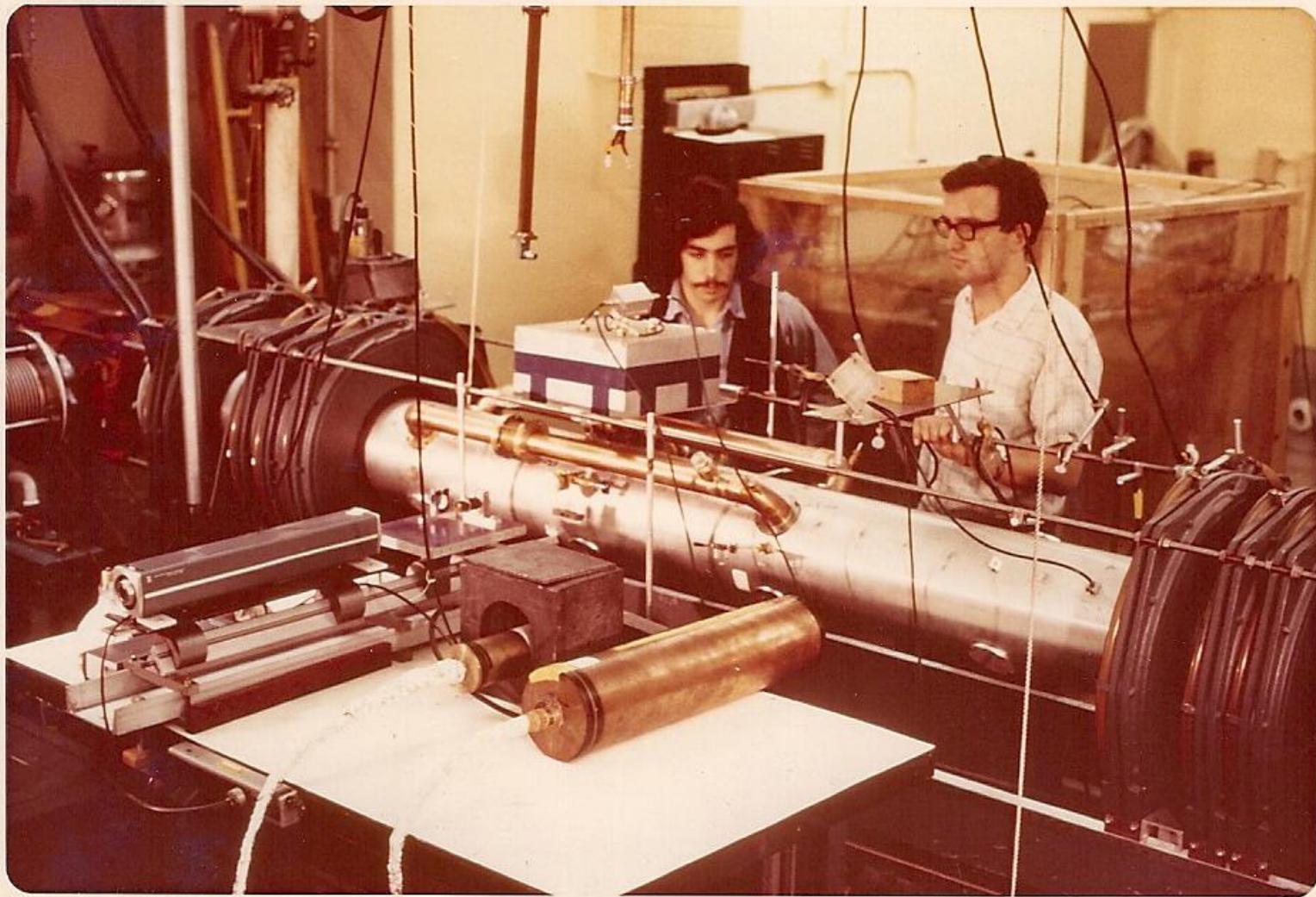


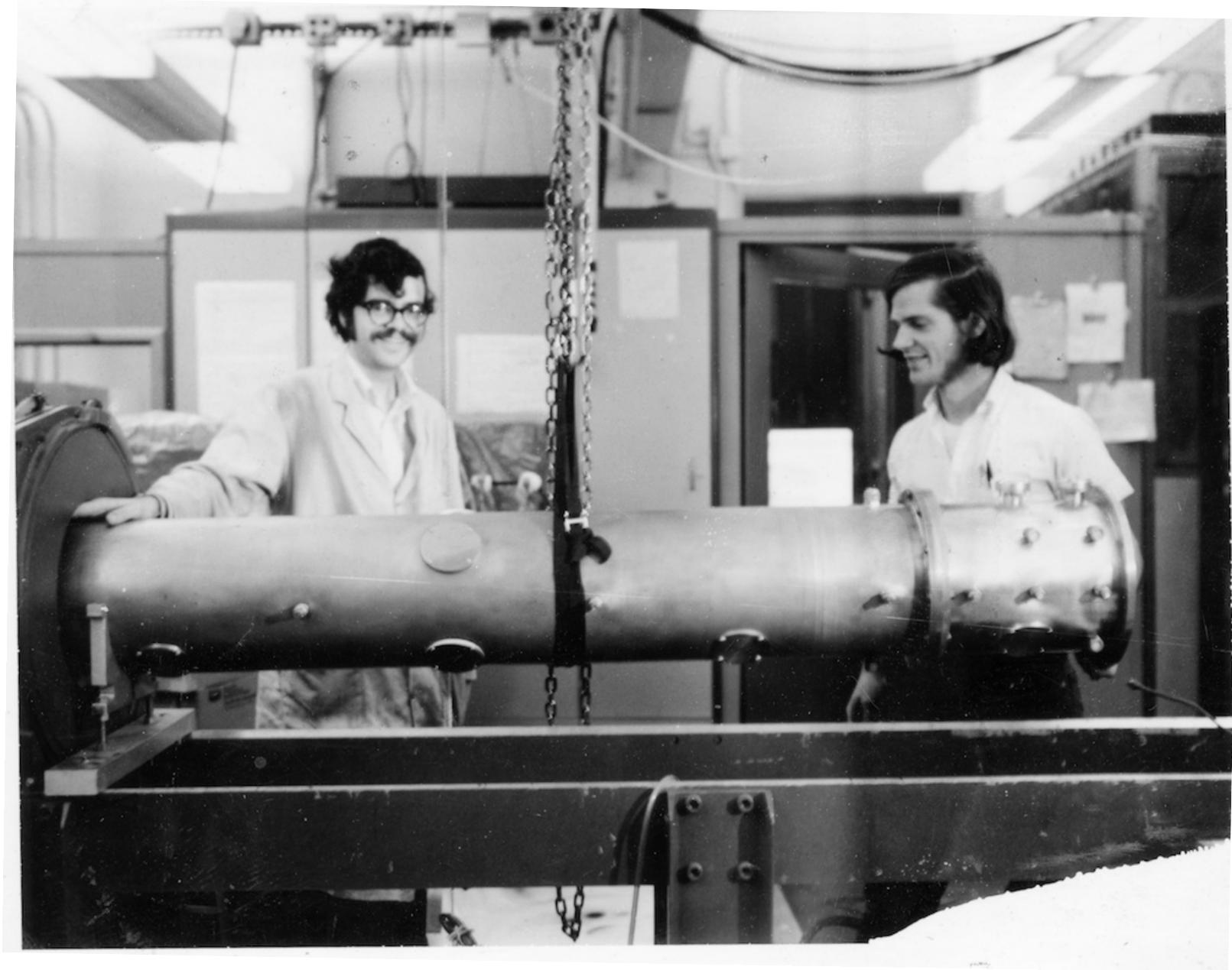
DAVID WHEELER



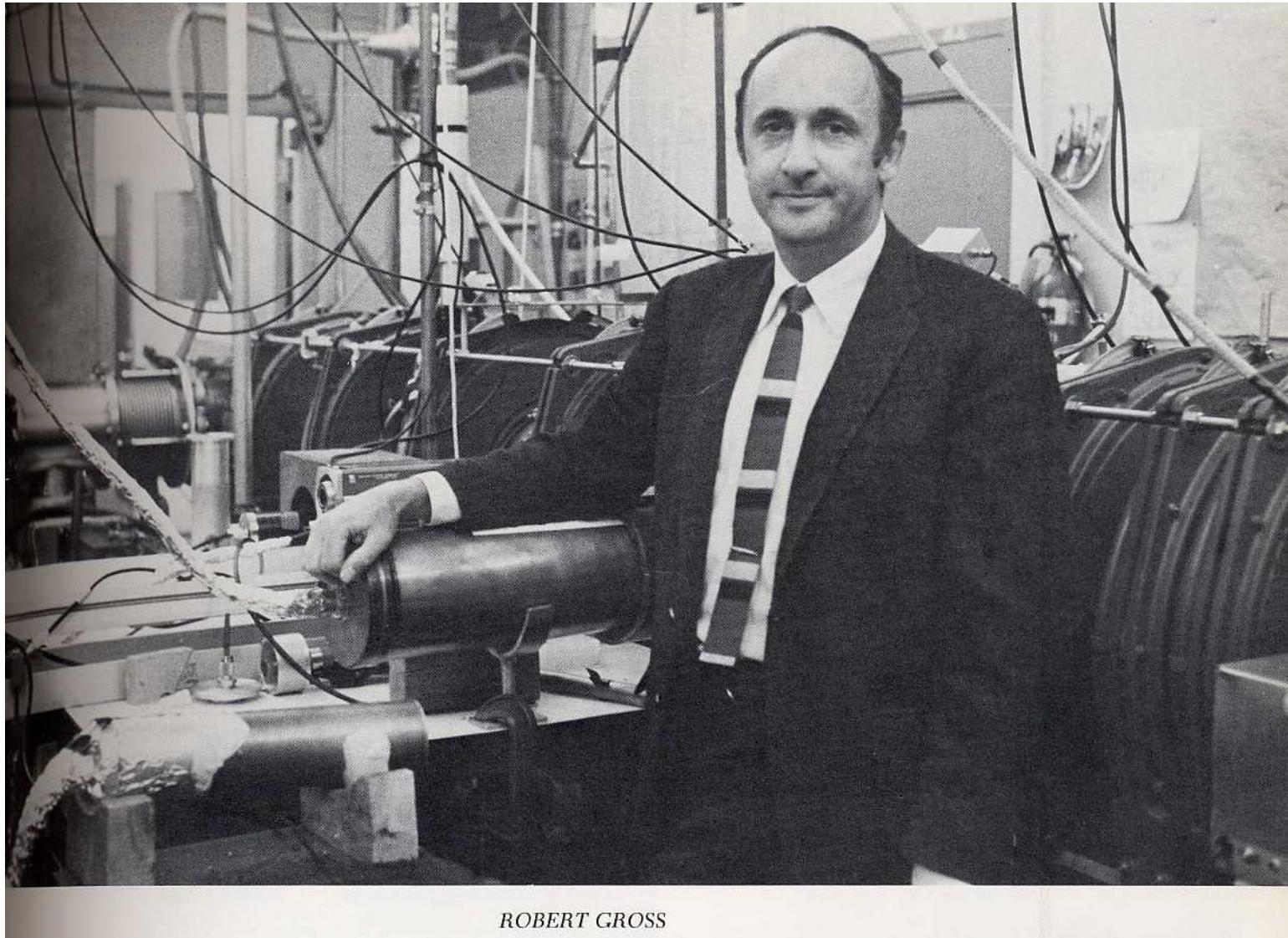
HERBERT GOLDSTEIN



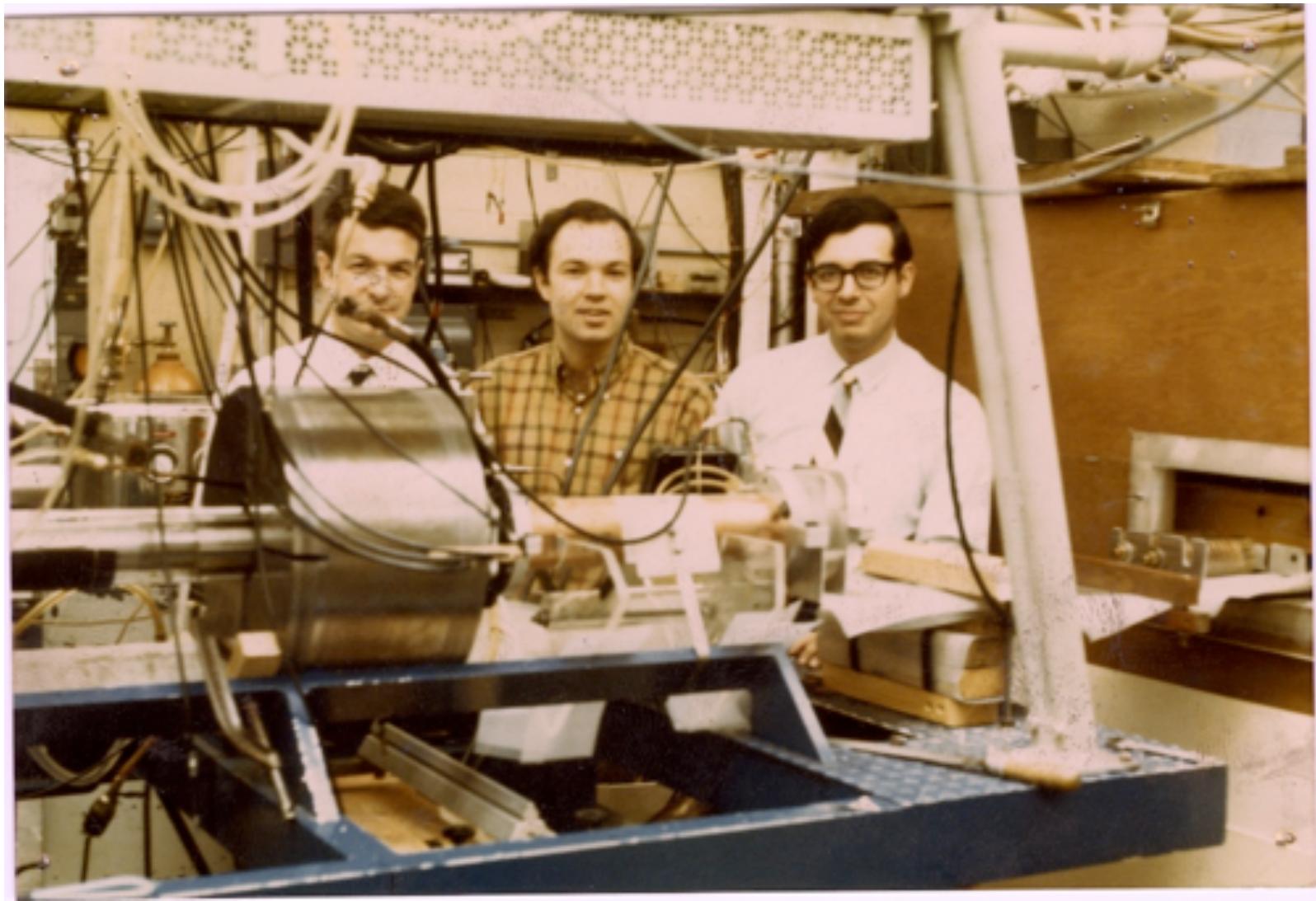




1974



ROBERT GROSS



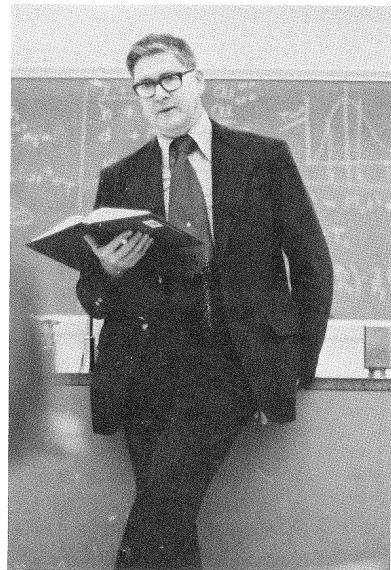
1975



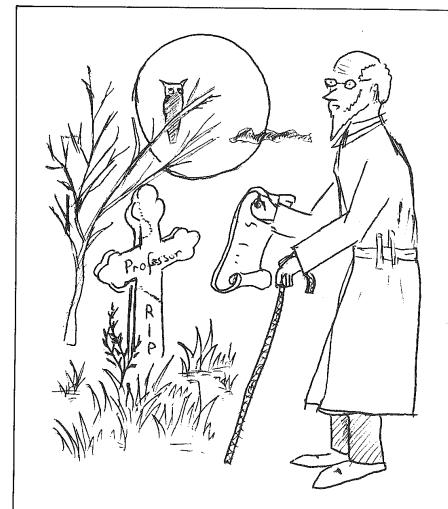
Professor John R. Dunning



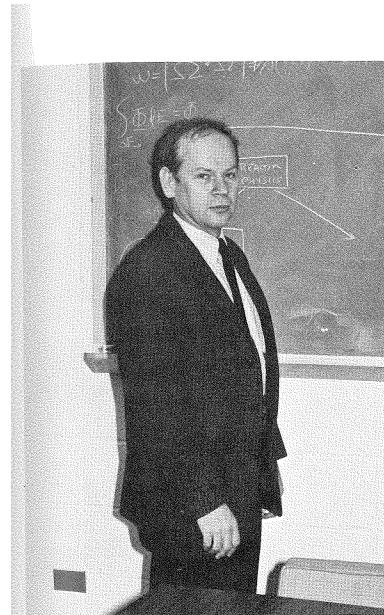
Professor Herbert Goldstein



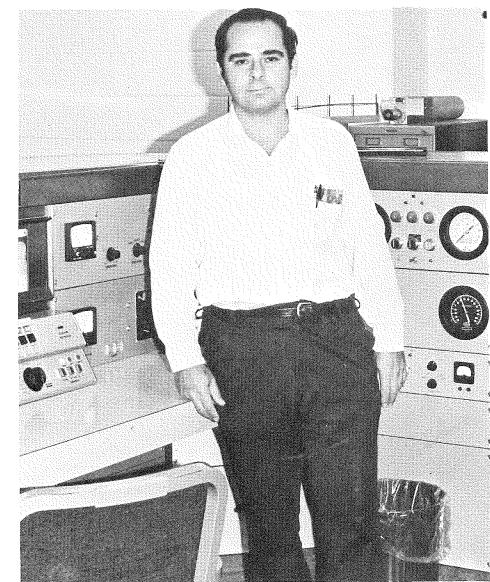
Professor William W. Havens, Jr.



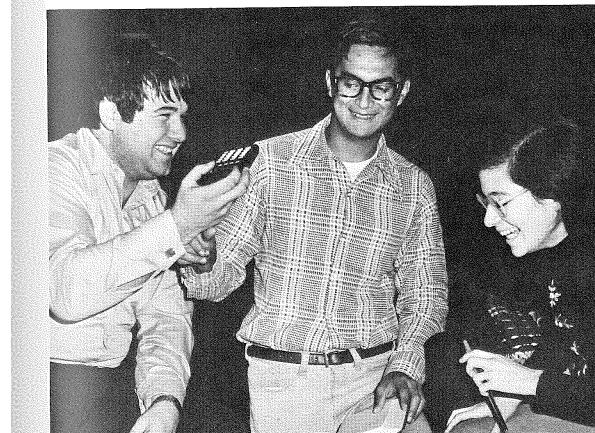
"Do you still accept this belated lab report Sir?"



Professor Leon J. Lidofsky

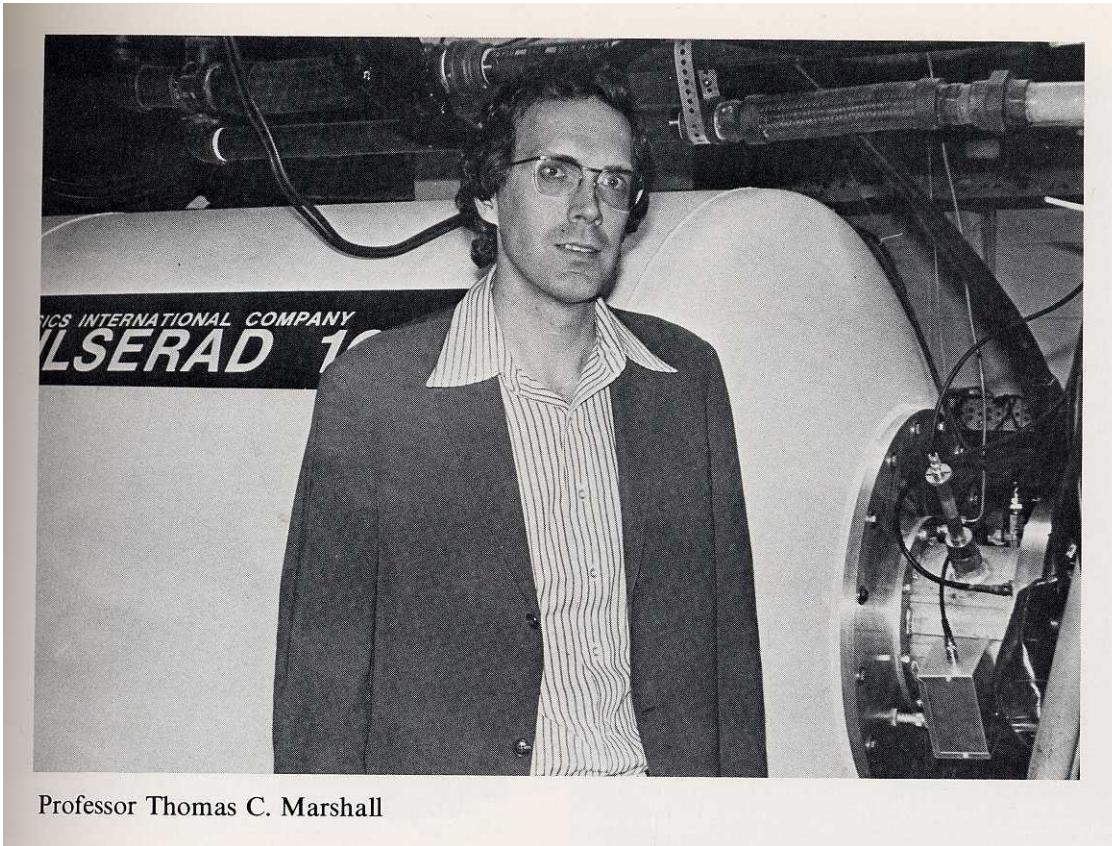


Professor Edward Melkonian

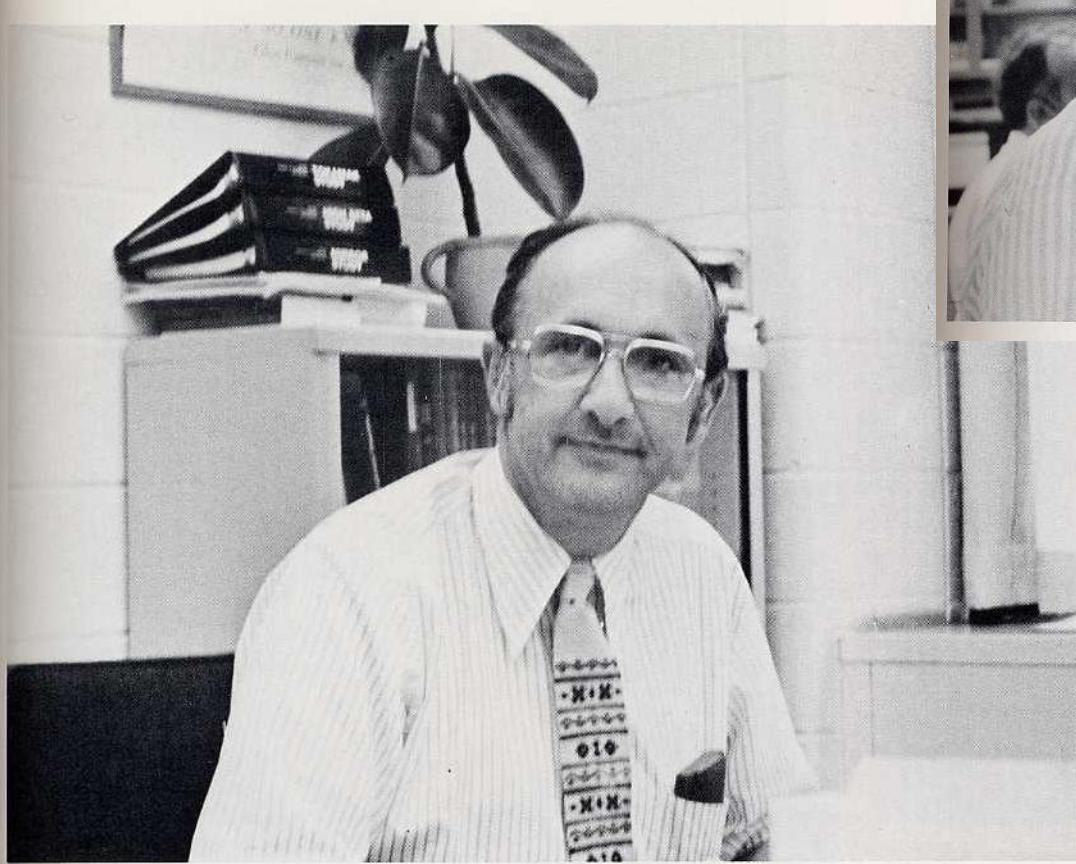


Bonifacio Hernandez

1975



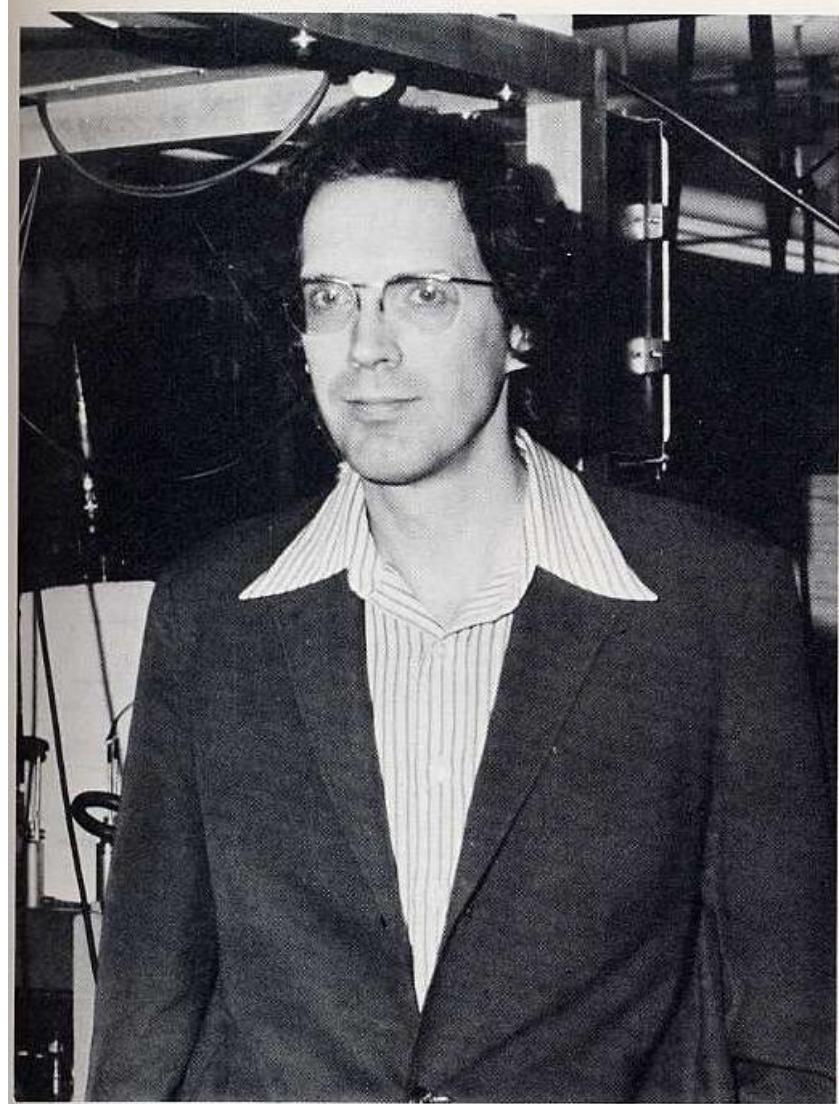
1976



Prof. Robert A. Gross

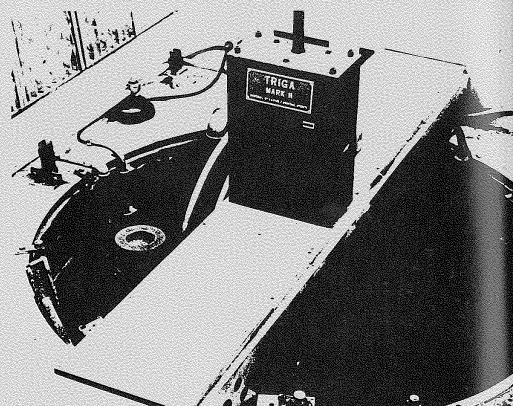
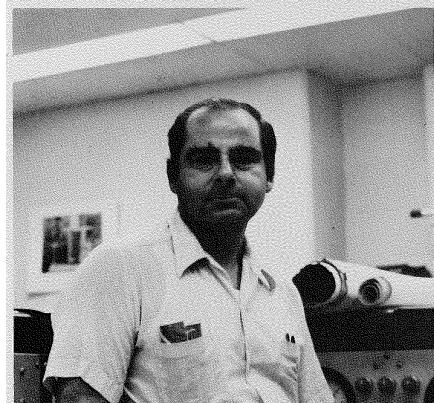
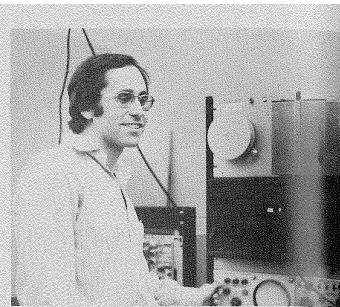


1976

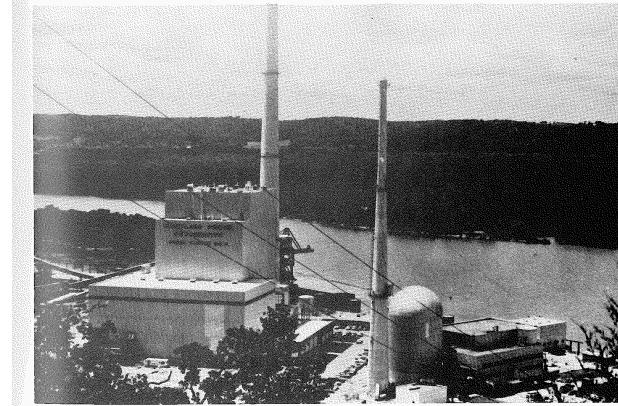


Prof. Thomas Marshall

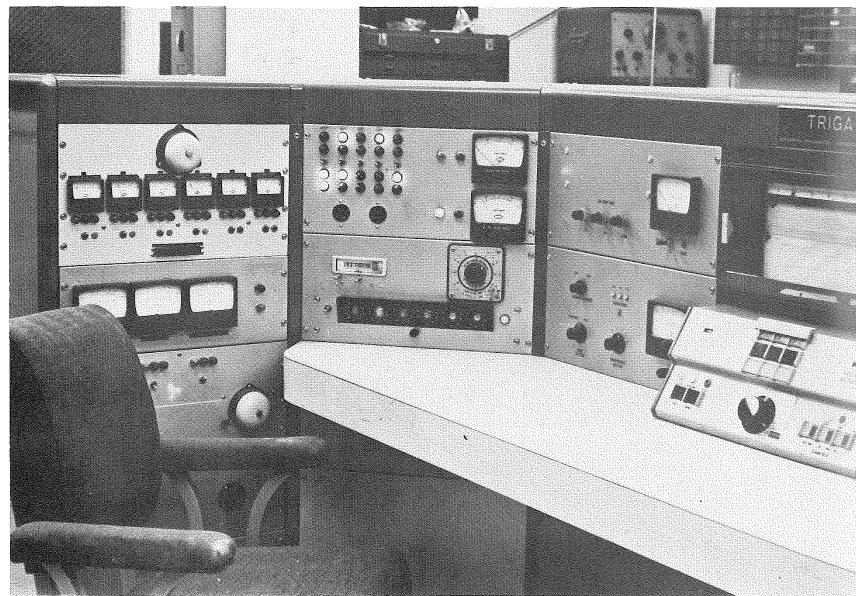
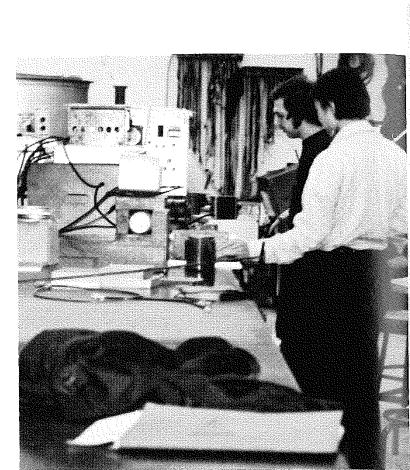
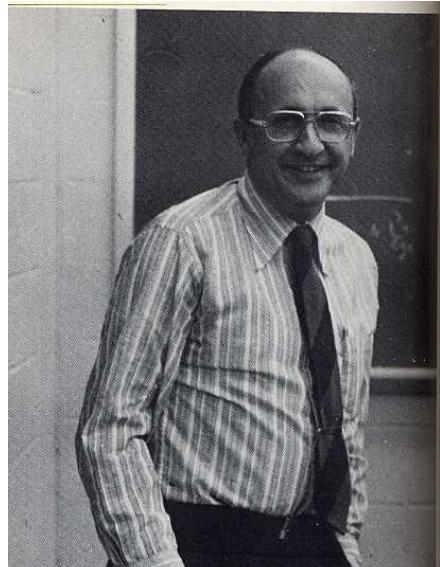
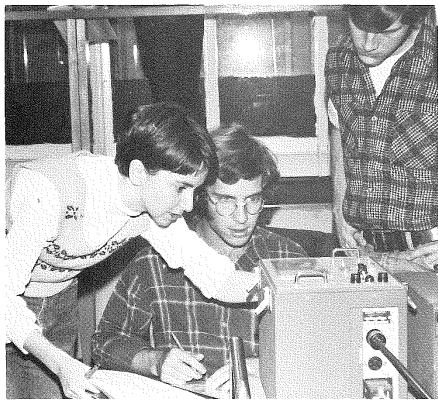
1977



Prof. Leon J. Lidofsky



1977



Prof. William W. Havens Jr.

1978



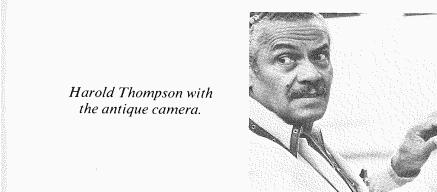
Prof. Baghat



Jerry Bay vs. Al Pisano



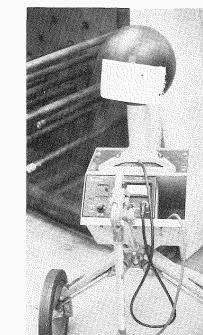
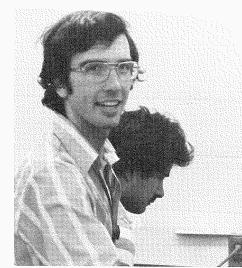
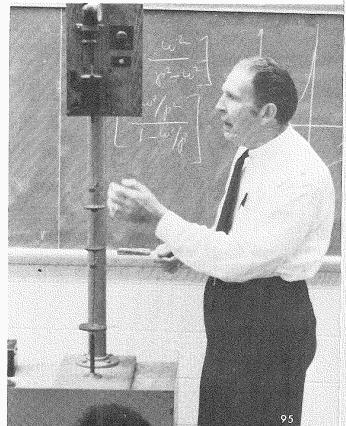
Prof. Chu

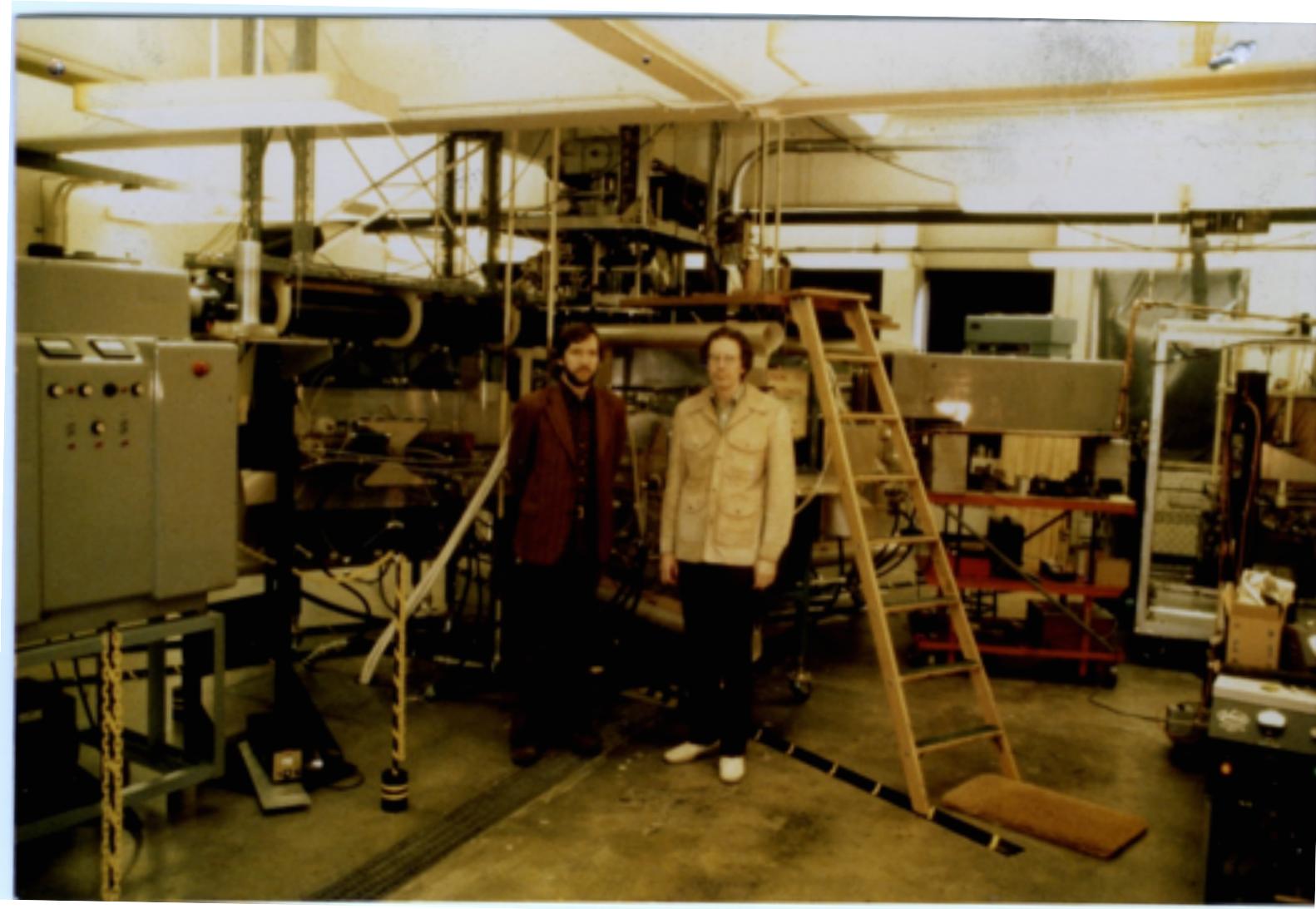


Harold Thompson with
the antique camera.



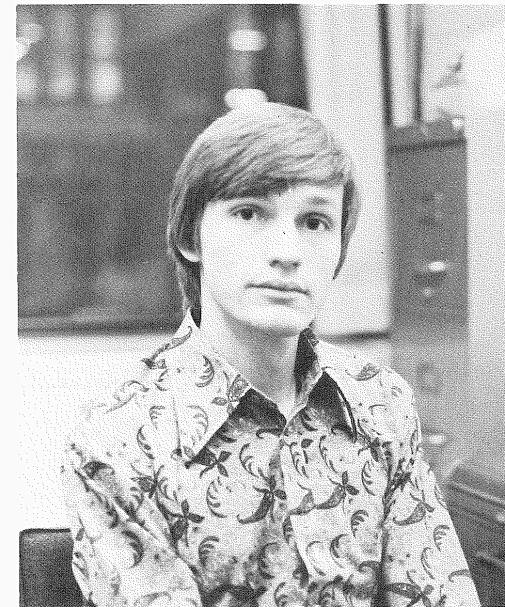
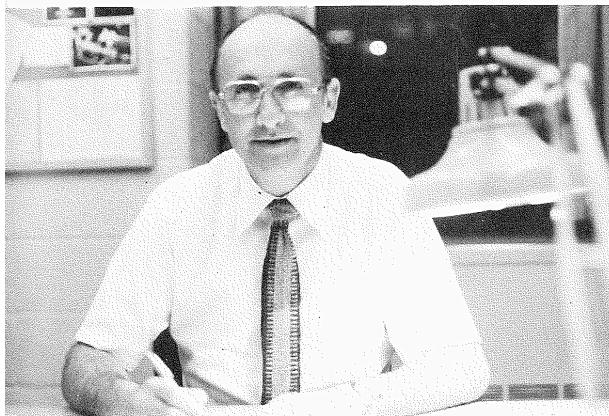
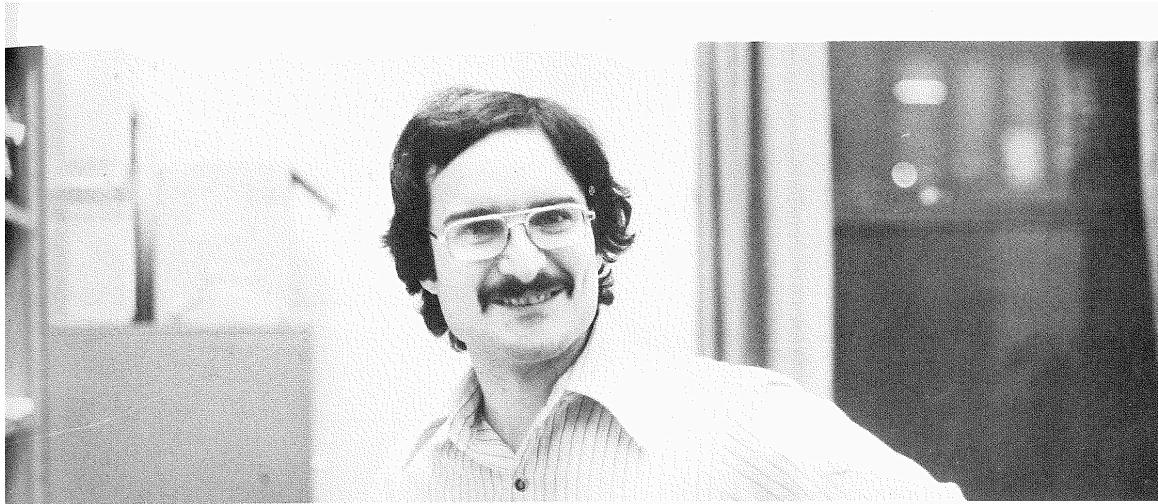
Joe Evanish







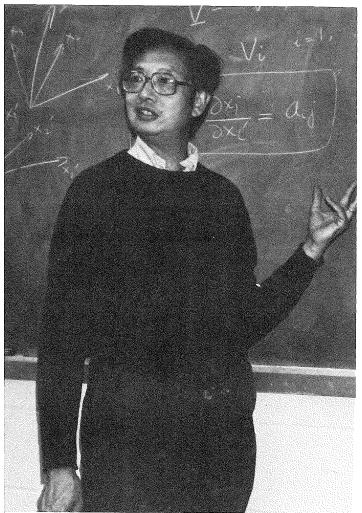
1979



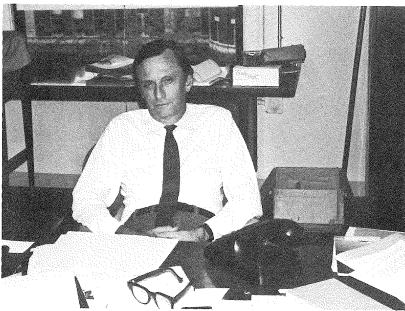
1980-1985



1980



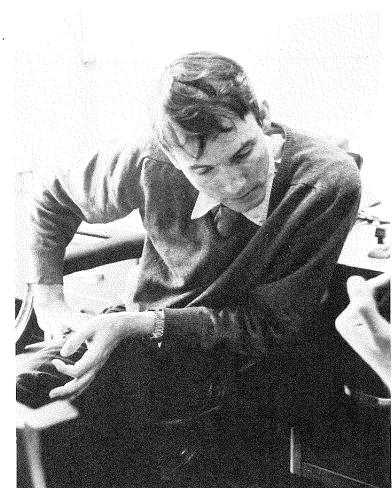
C. K. Chu



Henry M. Foley



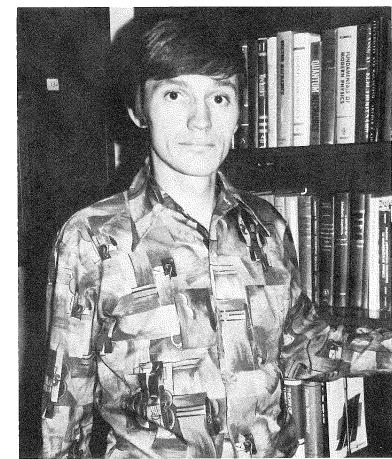
Robert A. Gross, Chairman



William Happer, Jr.

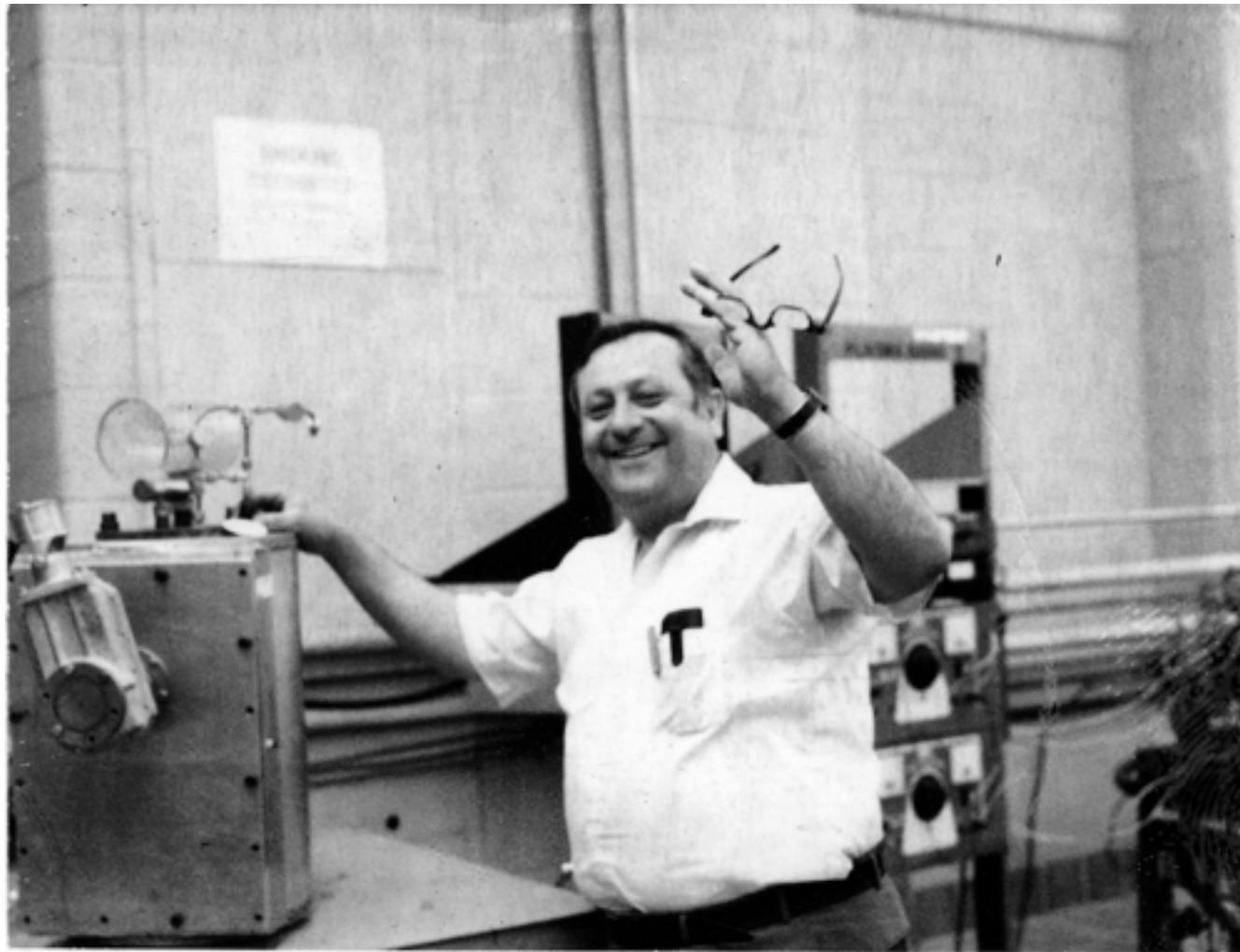


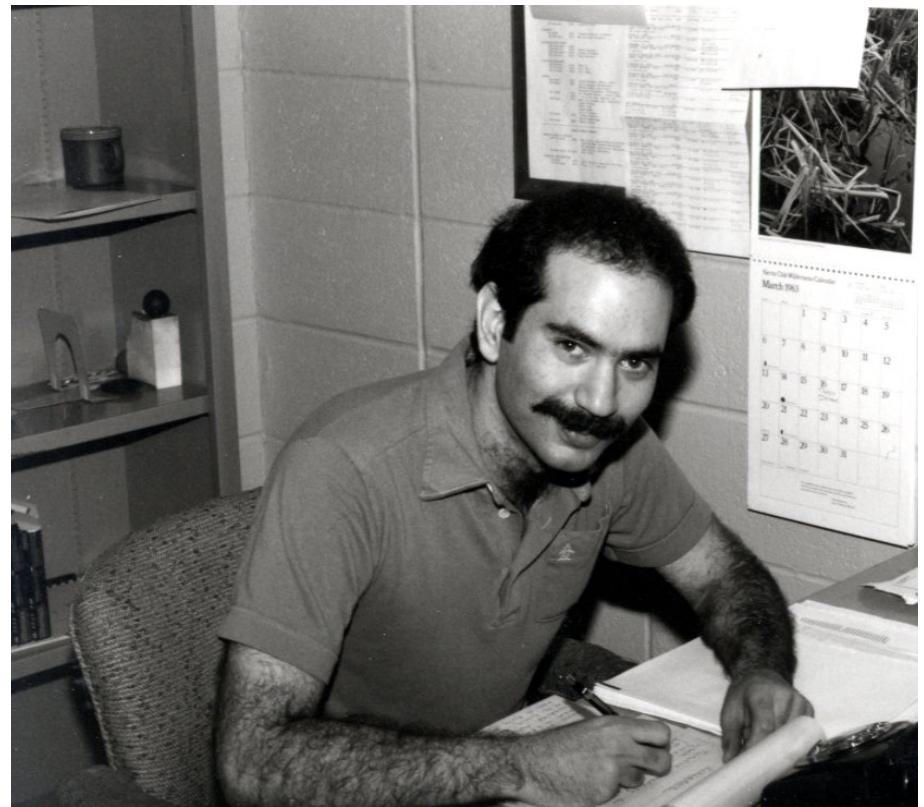
William W. Havens, Jr.



R. Shayne Johnston



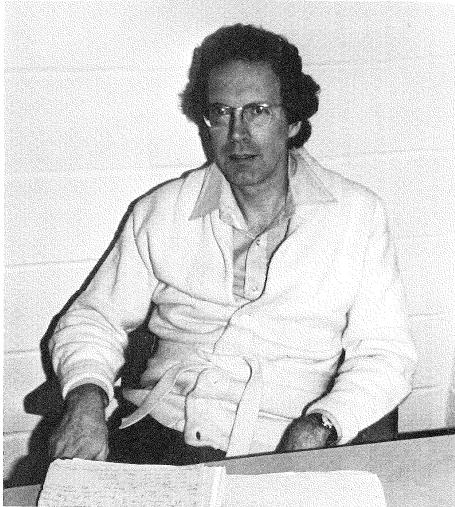




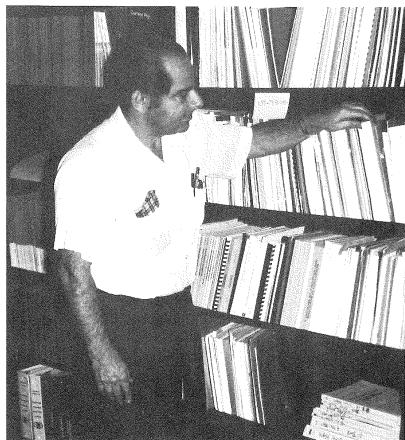
1980



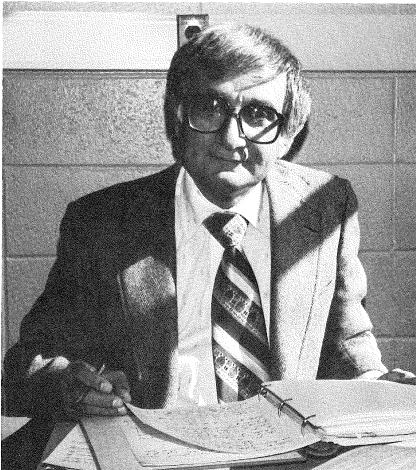
Leon J. Lidofsky



Thomas C. Marshall

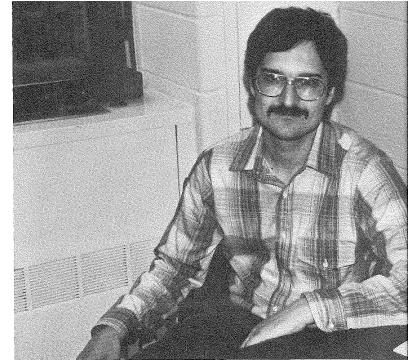


Edward Melkonian

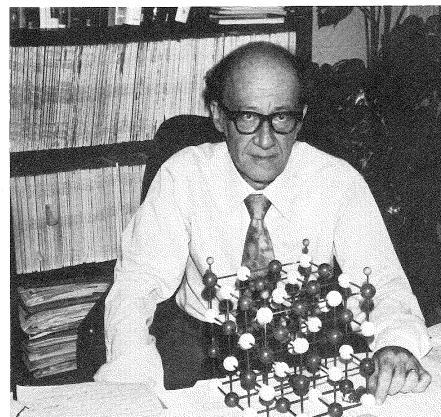


Amir N. Nahavandi

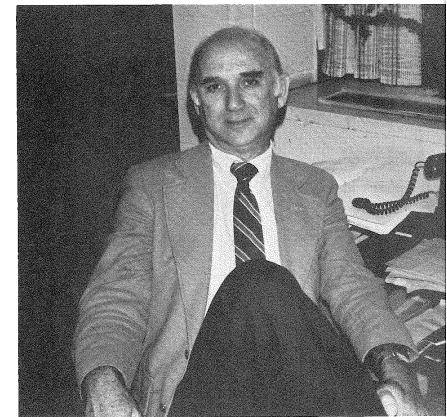
Gerald A. Navratil



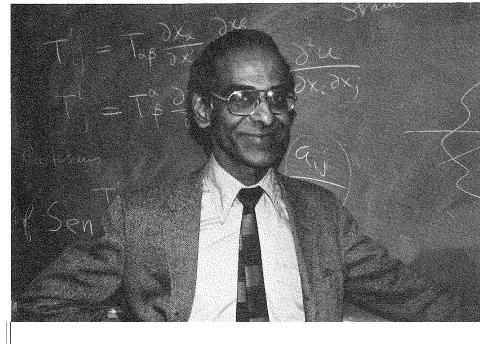
S. Perry Schlesinger



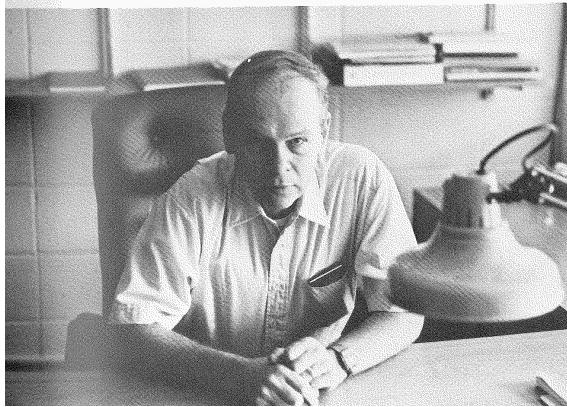
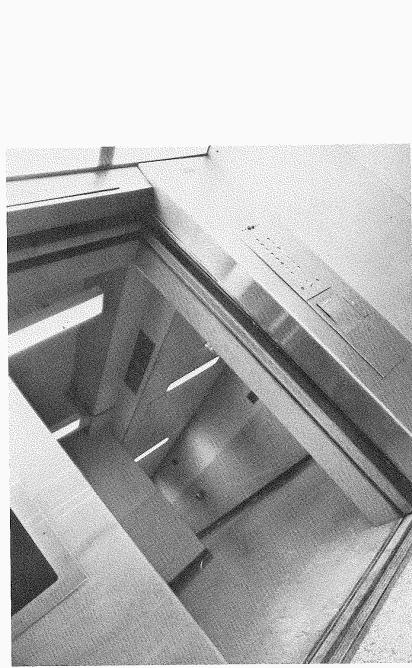
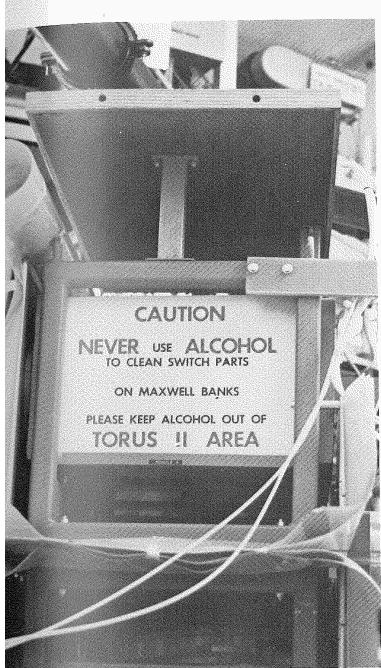
Arthur S. Nowick



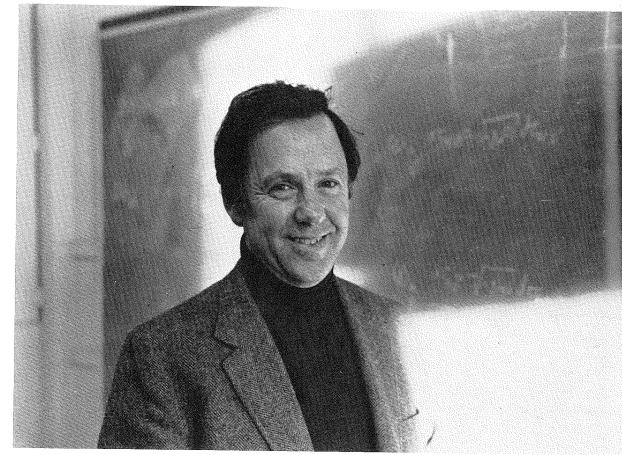
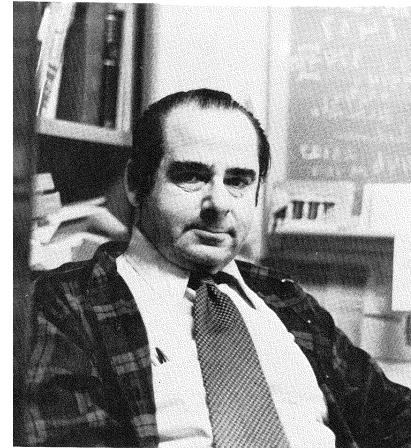
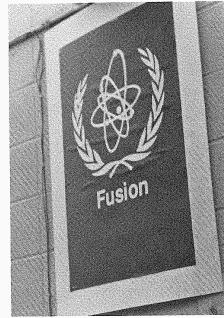
Malvin C. Teich



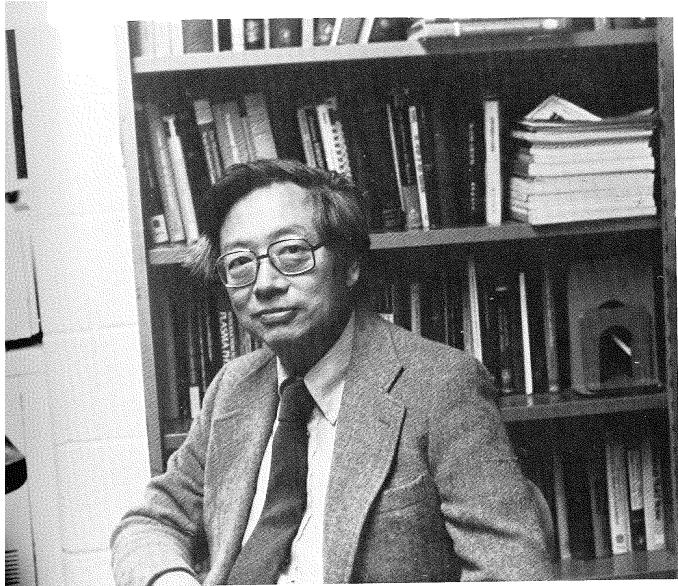
1981



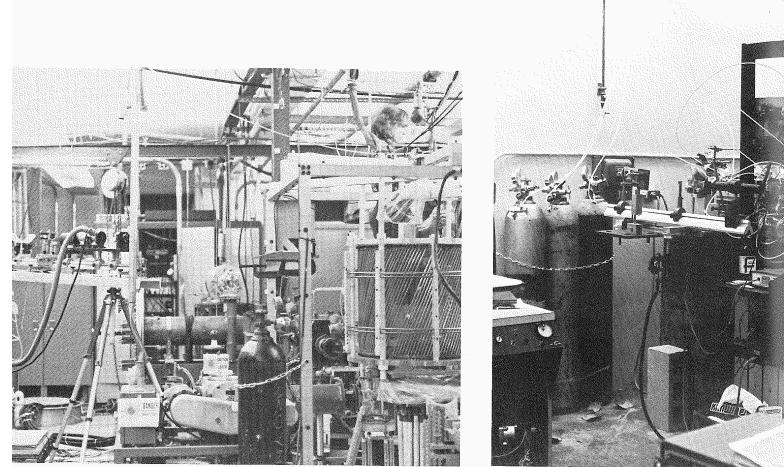
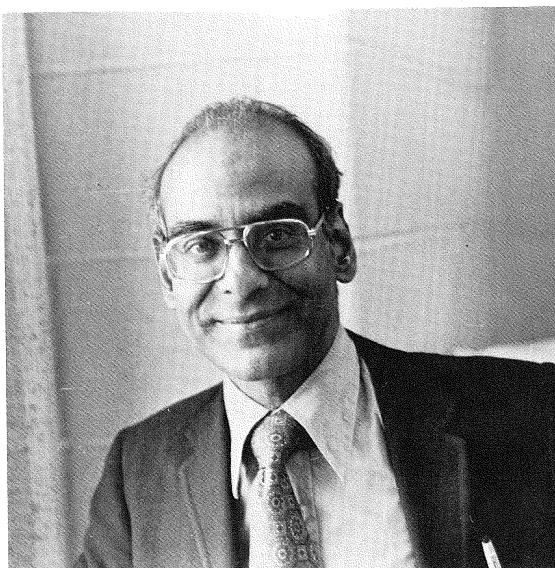
Left: Leon J. Lidofsky.



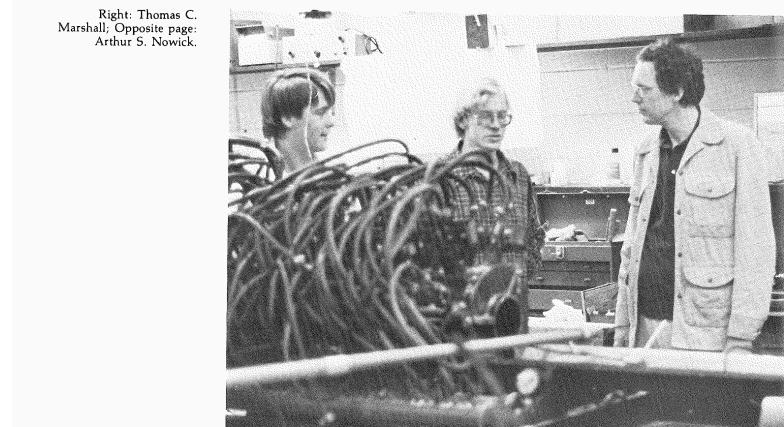
1981

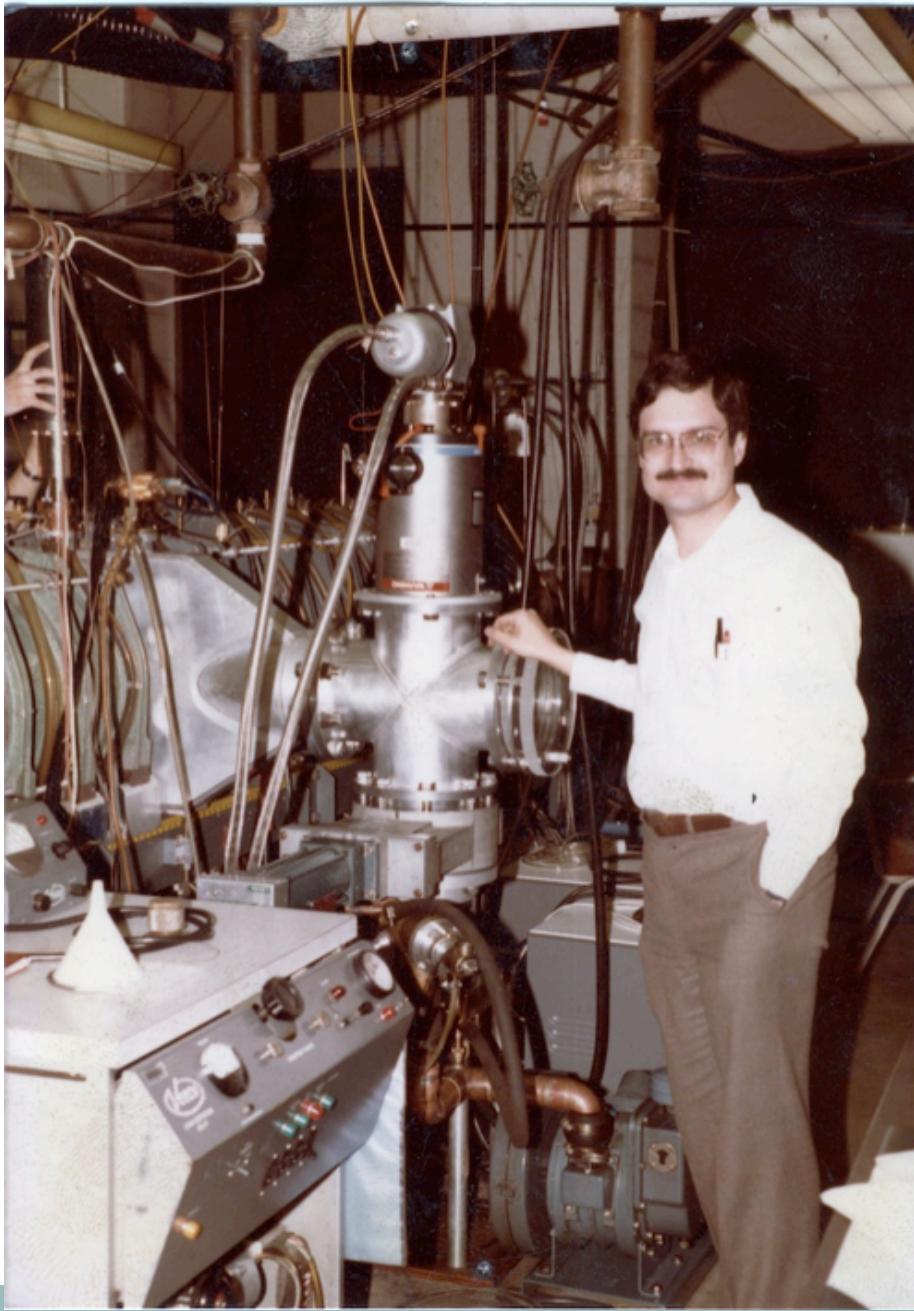


Clockwise from below: Amiya K. Sen, Herbert Goldstein, Malvin Ruderman, Edward Melkonian, Henry M. Foley, Chia-Kun Chu.

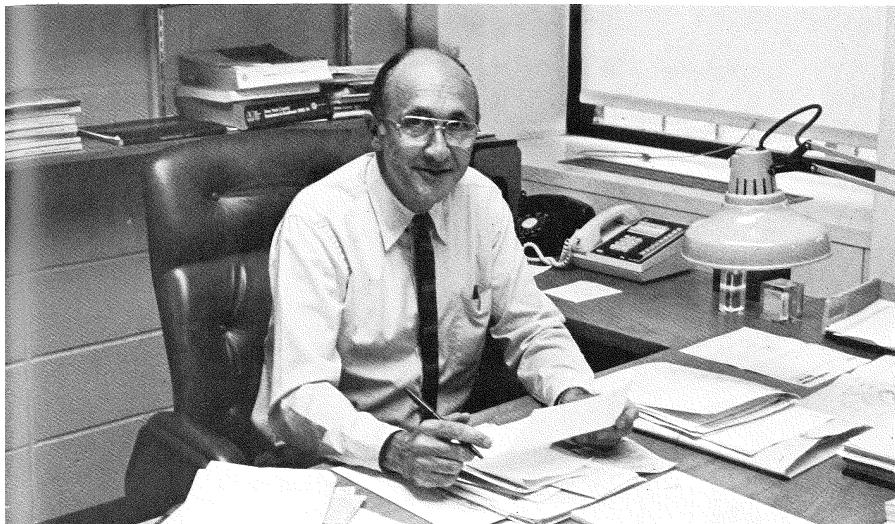


Right: Thomas C. Marshall; Opposite page: Arthur S. Nowick.

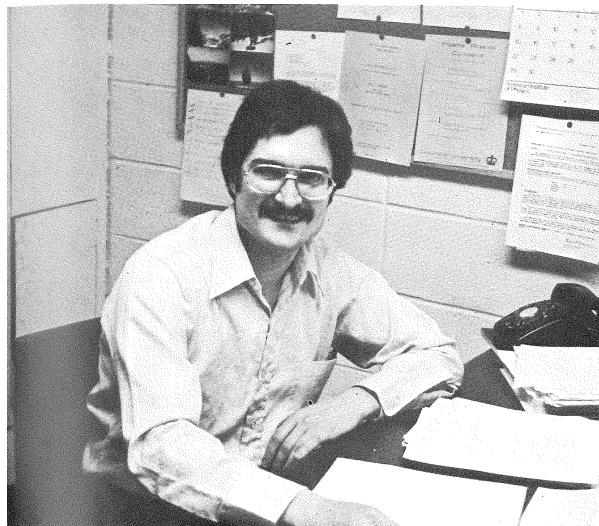
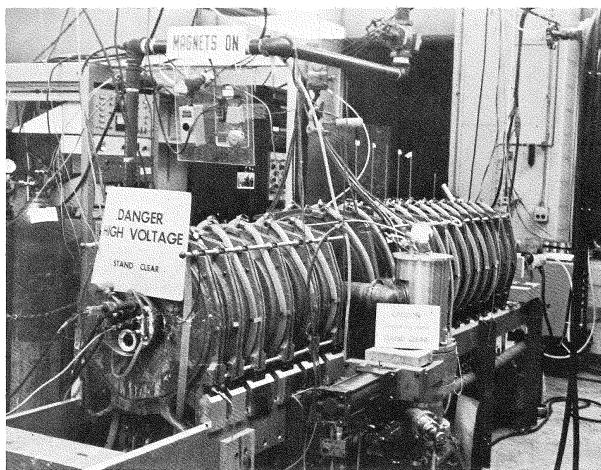




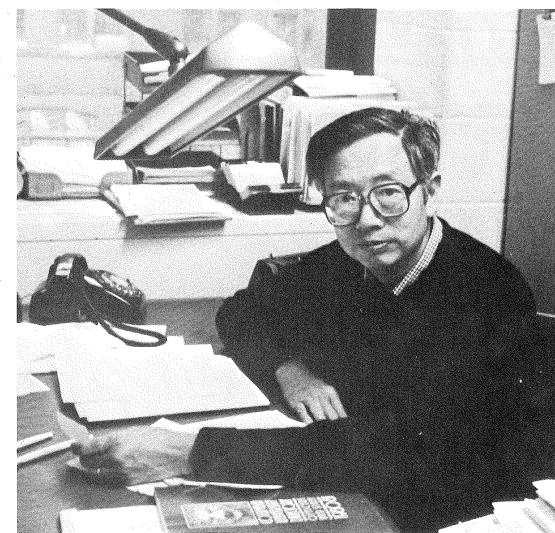
1982



Robert A. Gross



Gerald A.
Navratil



Chia Kun
Chu

1982

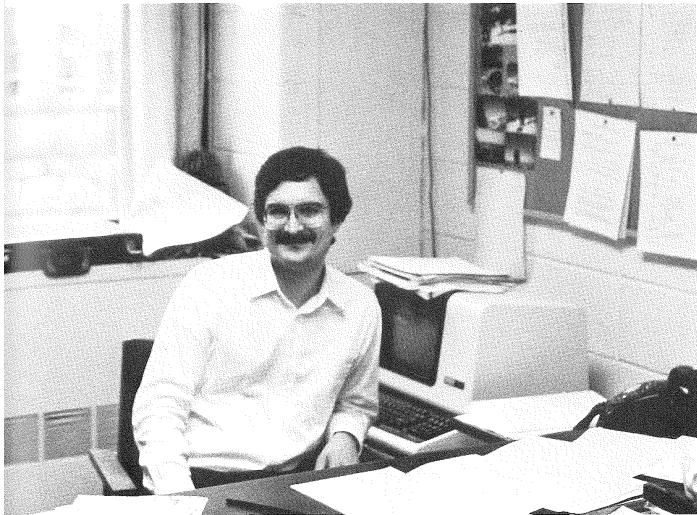


1983



Thomas C.
Marshall

1984



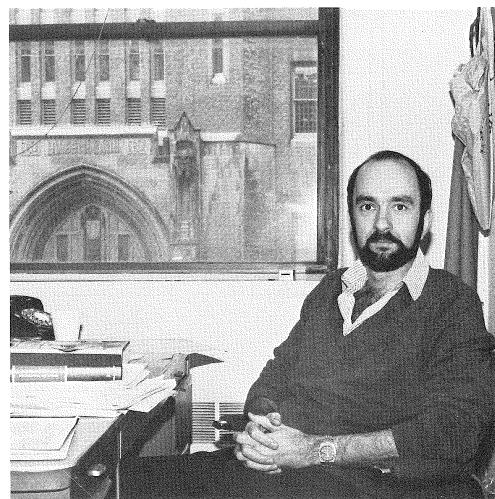
Gerald A. Navratil



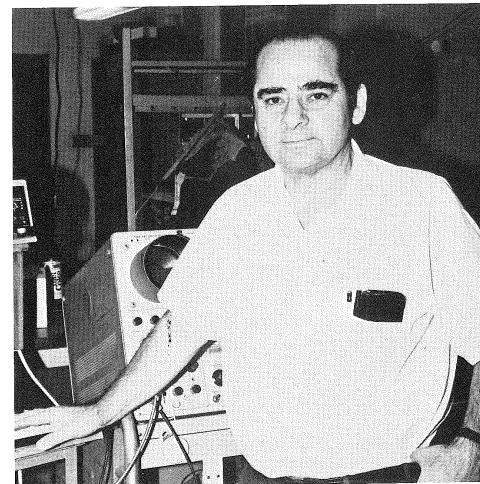
Chia Kun Chu, Chairman



Thomas C. Marshall



Michael Tabor



Edward Melkonian

1984

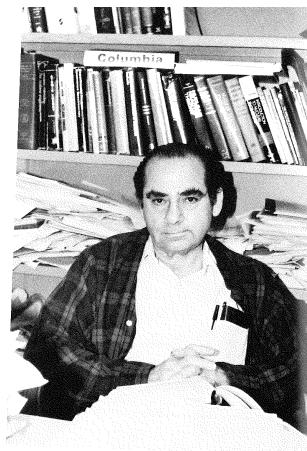


Robert Gross, Dean

1985



Chia Kun Chu, Chairman



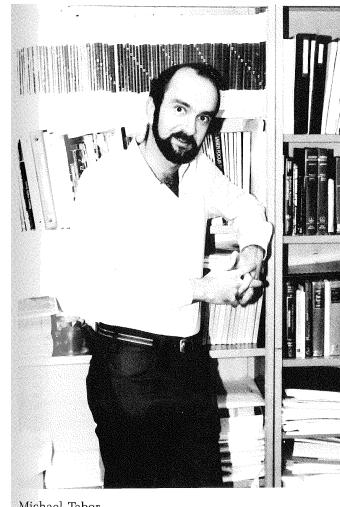
Edward Melkor



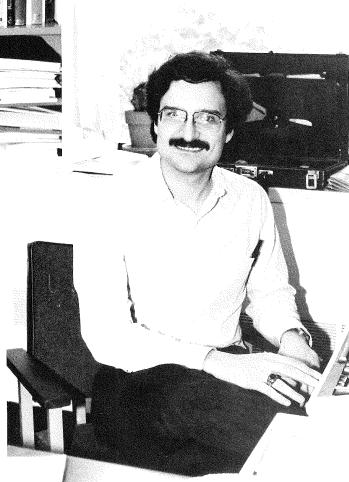
Thomas Marshall



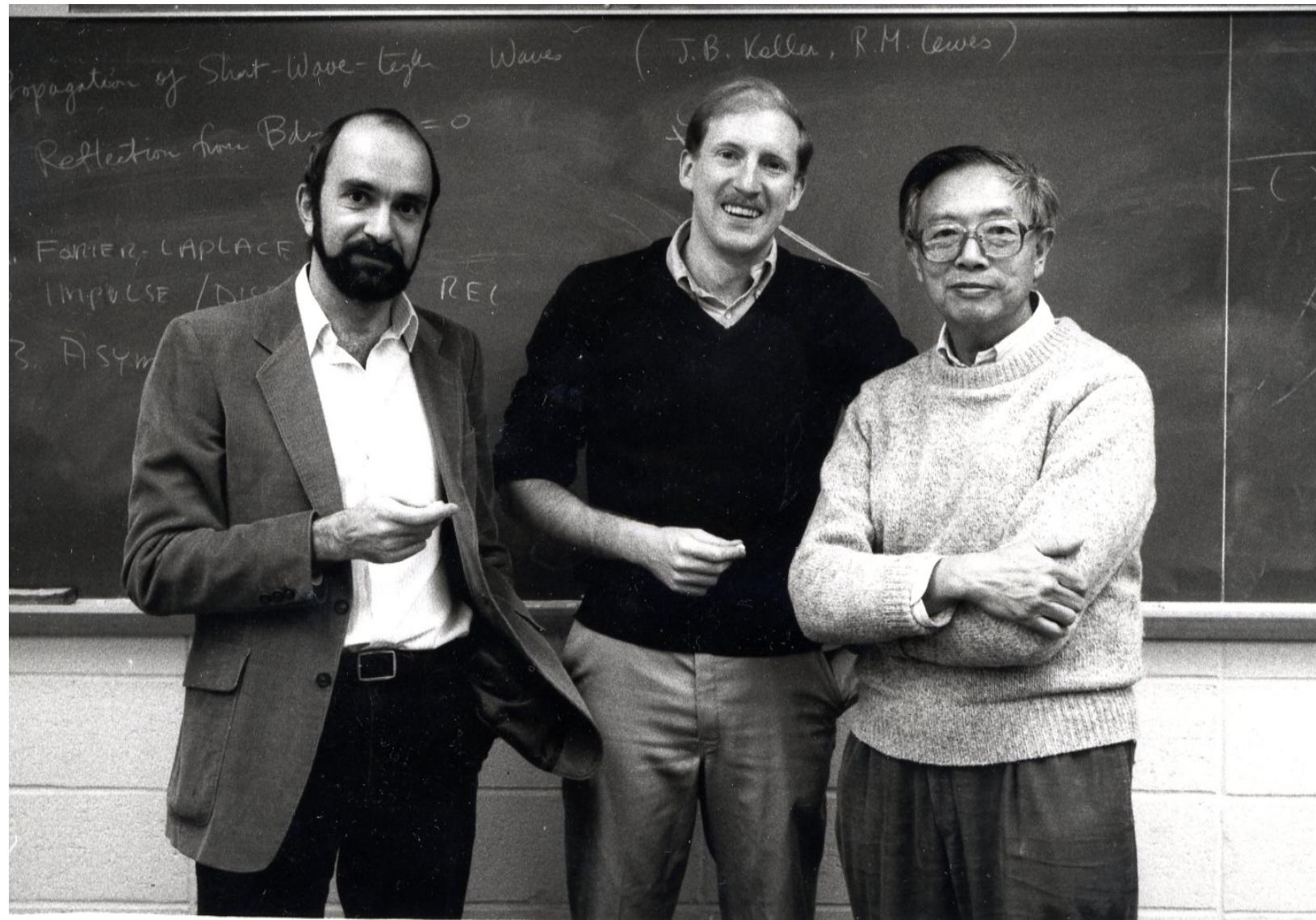
Amitava Bhattacharjee



Michael Tabor

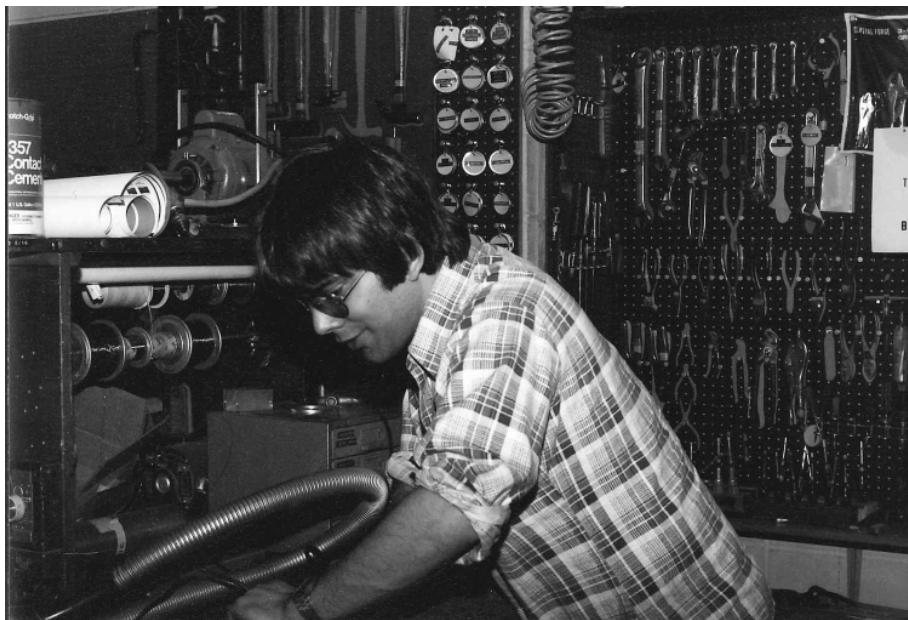


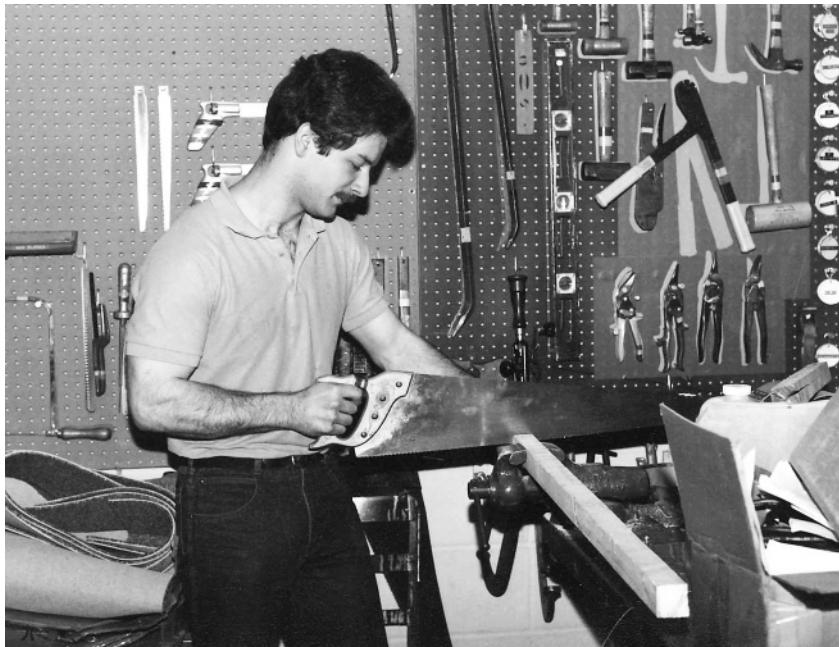
Gerald Navratil





1980-1985



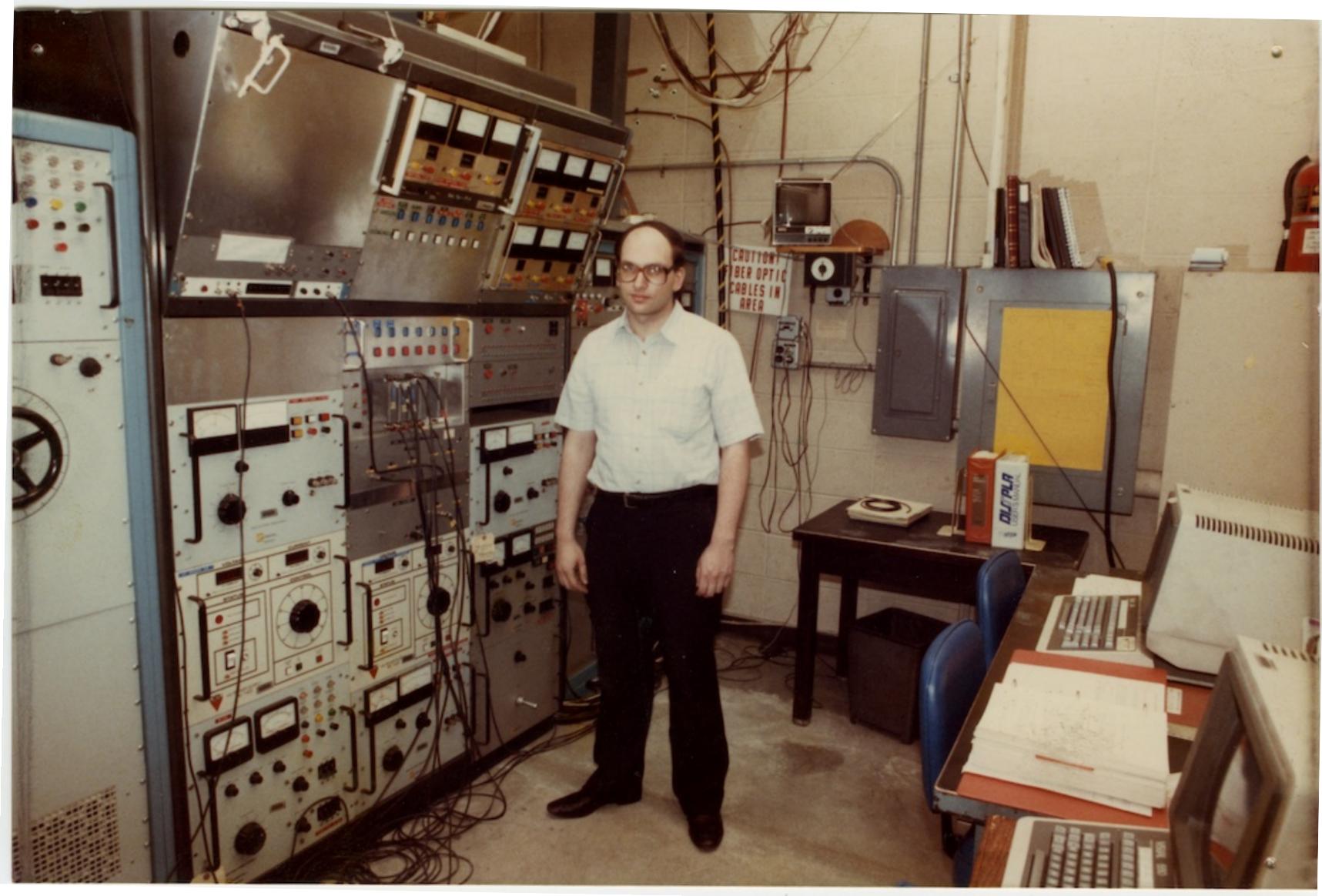


1980-1985

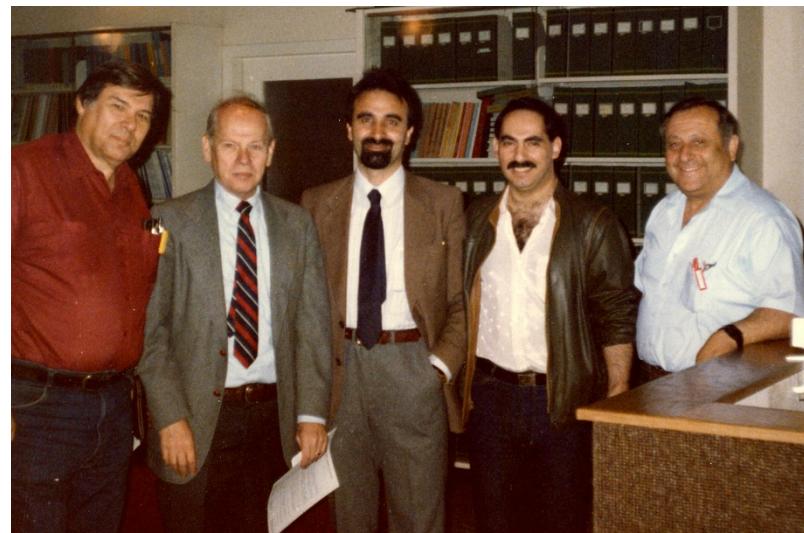


1980-1985





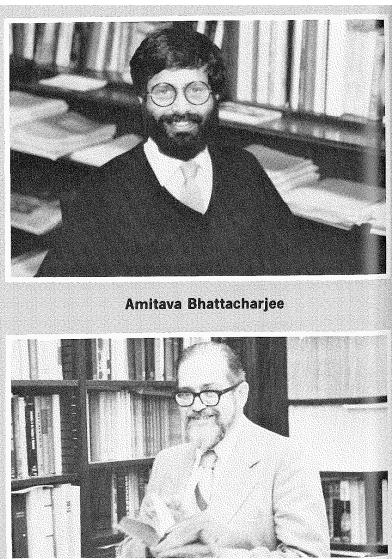
1980-1985



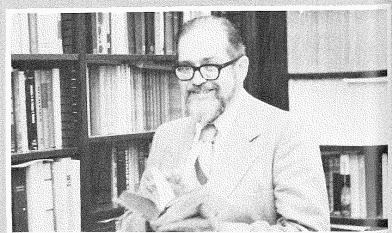
1986



C.K. Chu



Amitava Bhattacharjee



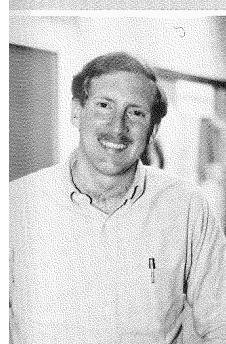
Herbert Goldstein



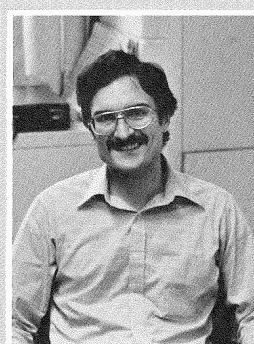
Leon Lidofsky



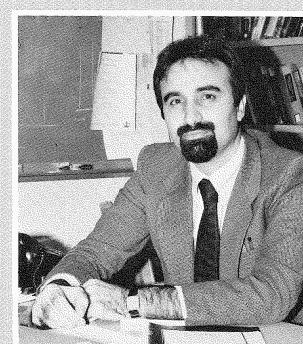
Thomas Marshall



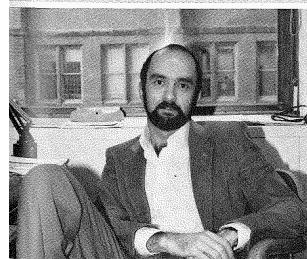
Michael Mael



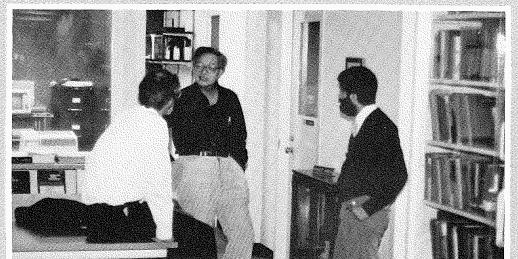
Gerald Navratil



Alireza Sedaghat



Michael Tabor

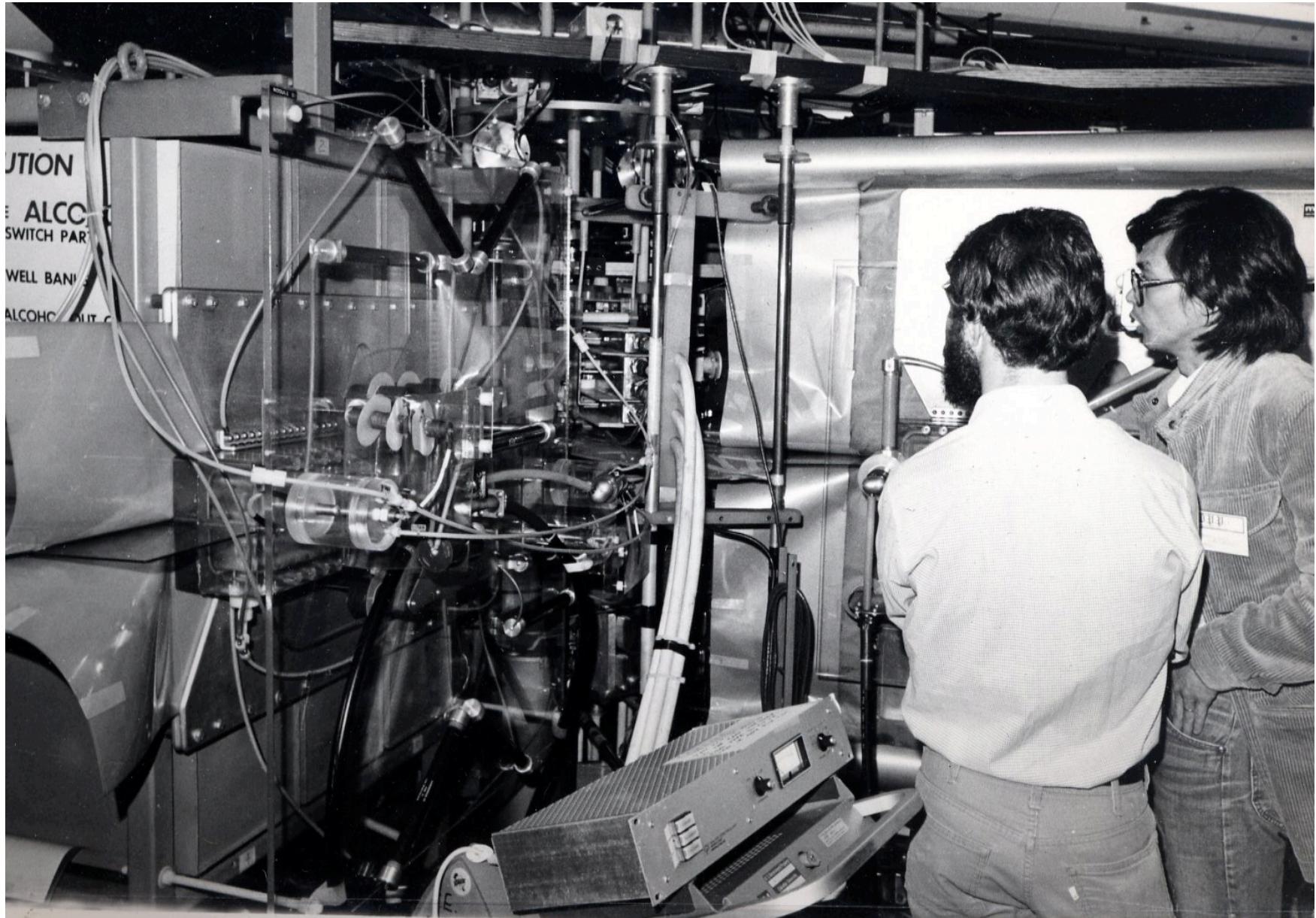


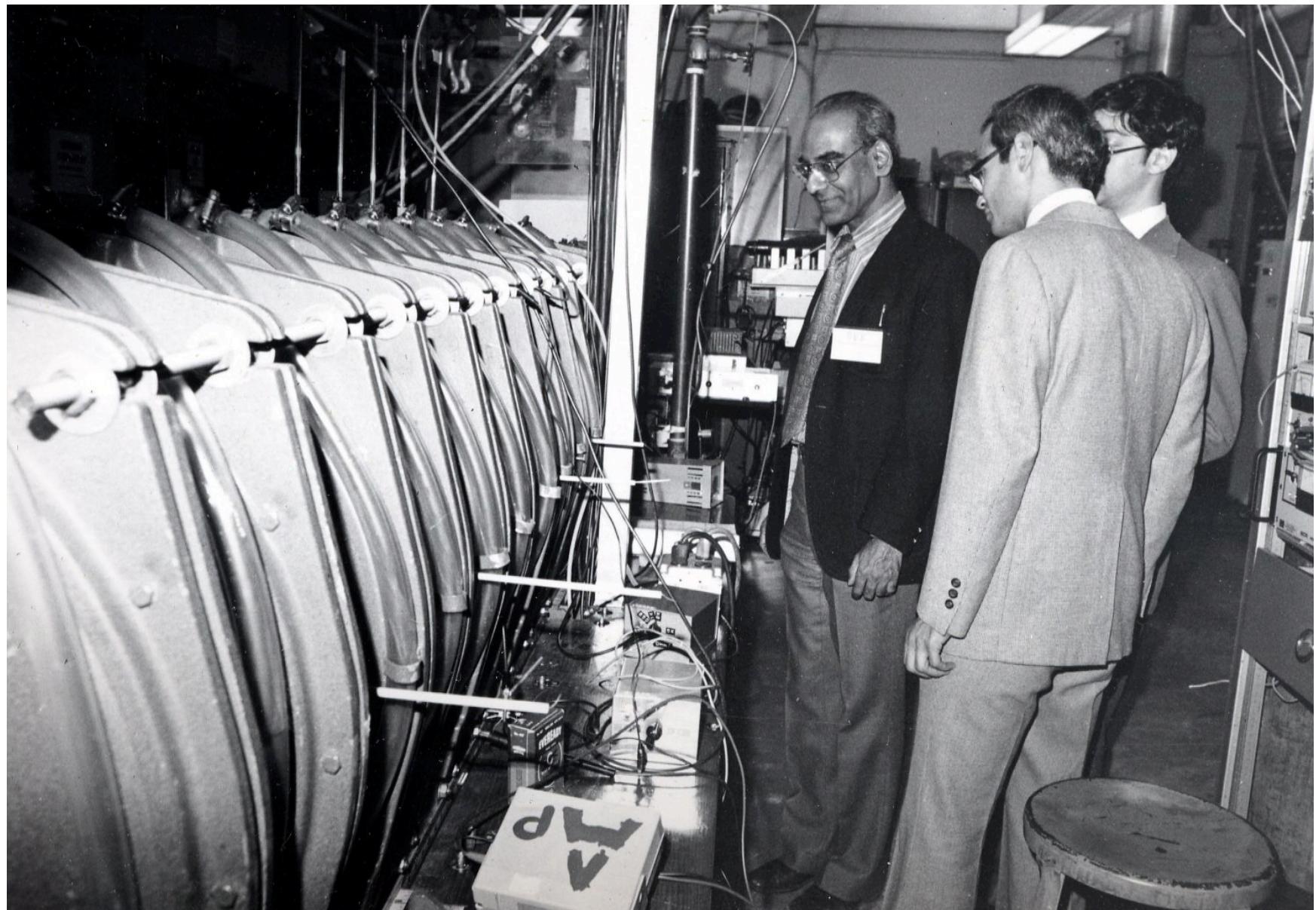
OK - So what's the plan guys?

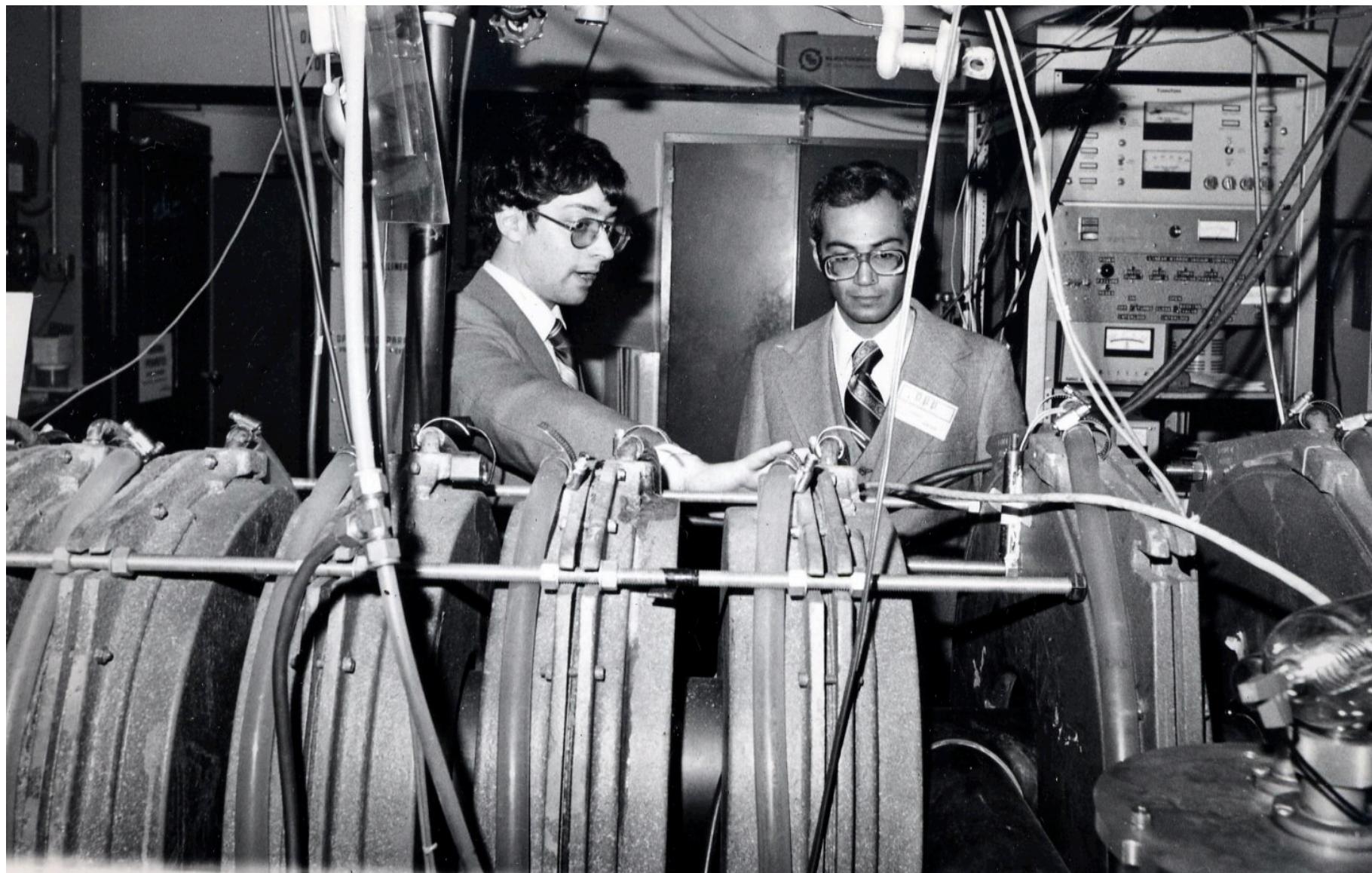
1986

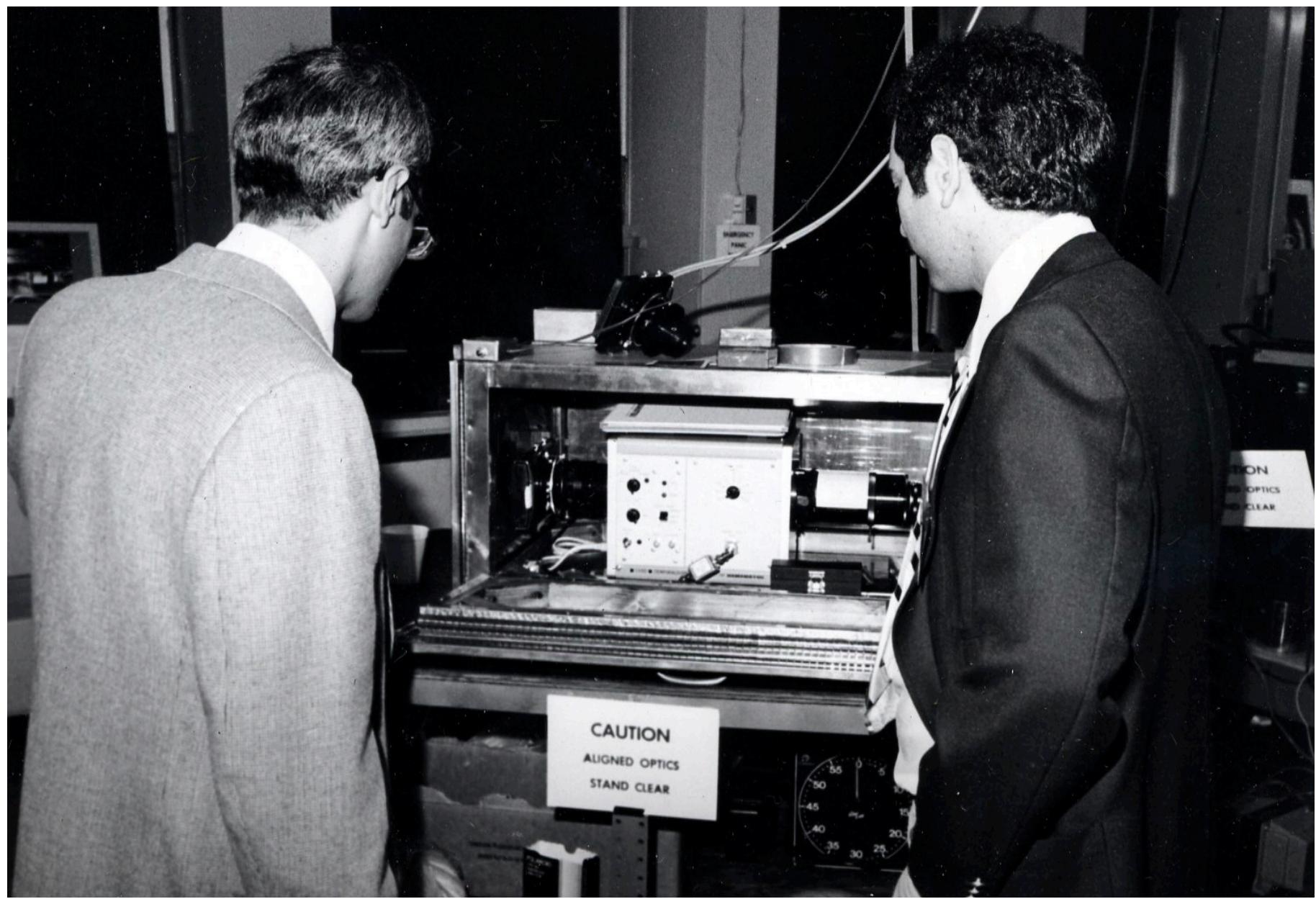


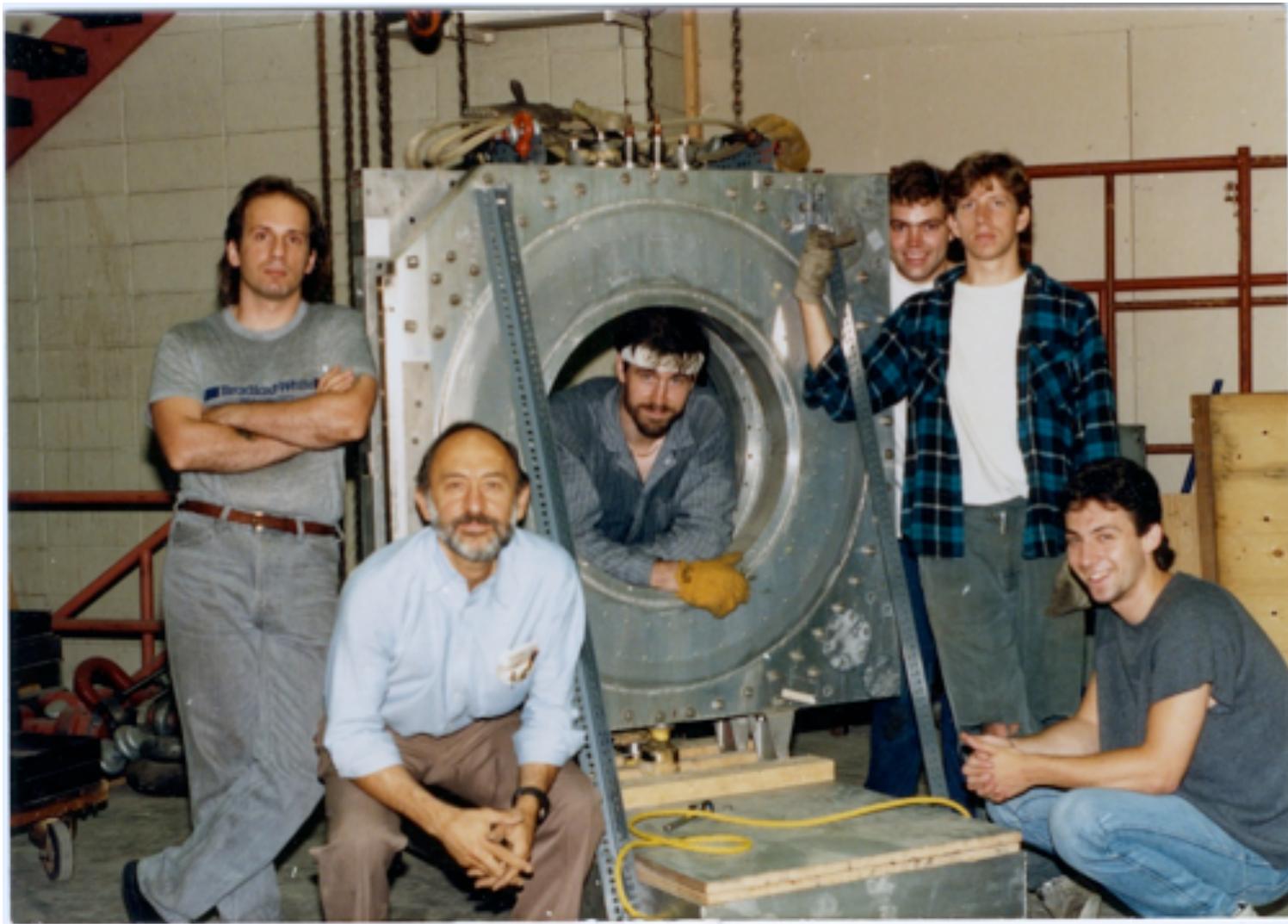
Robert A. Gross: DEAN

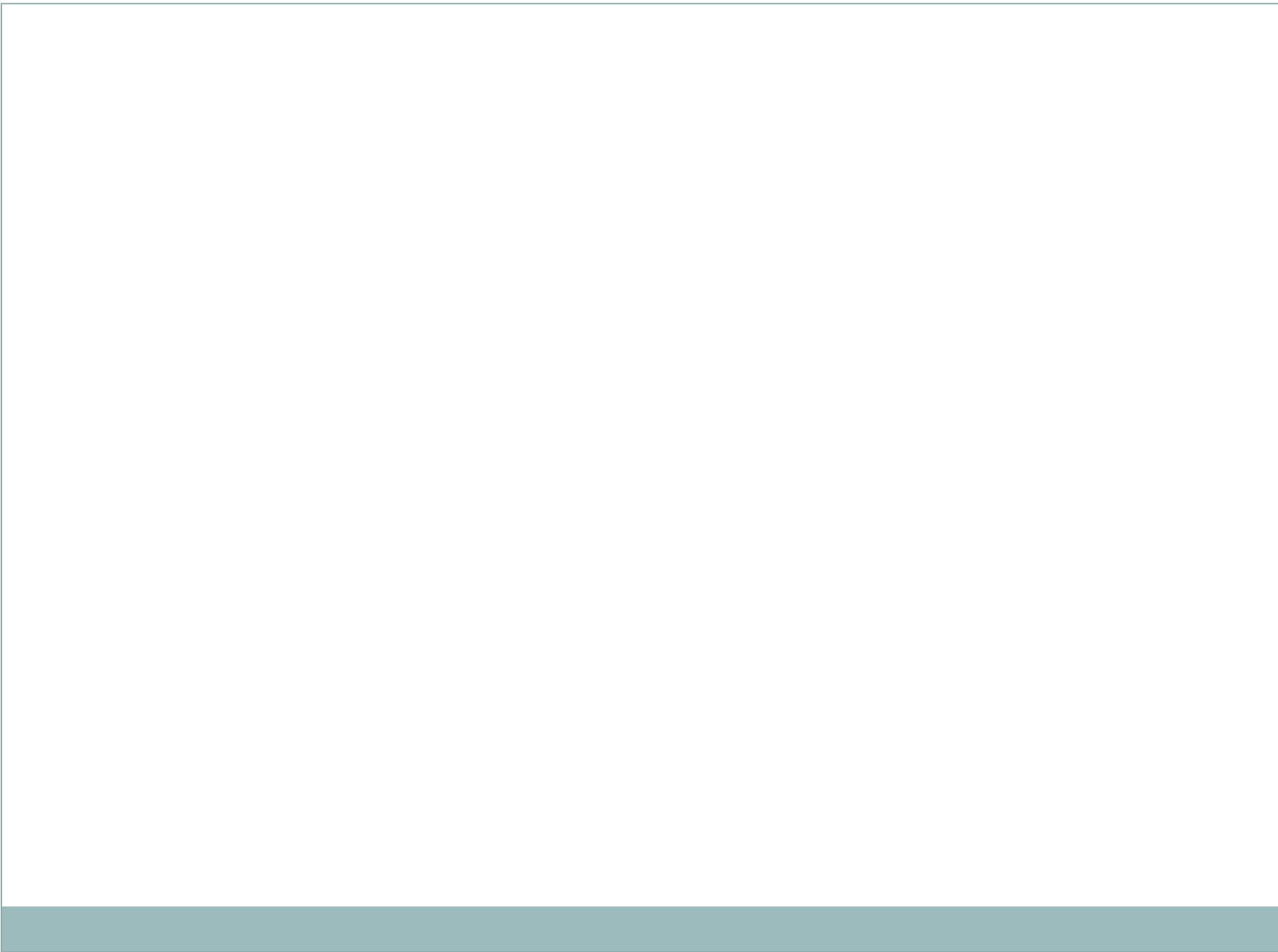




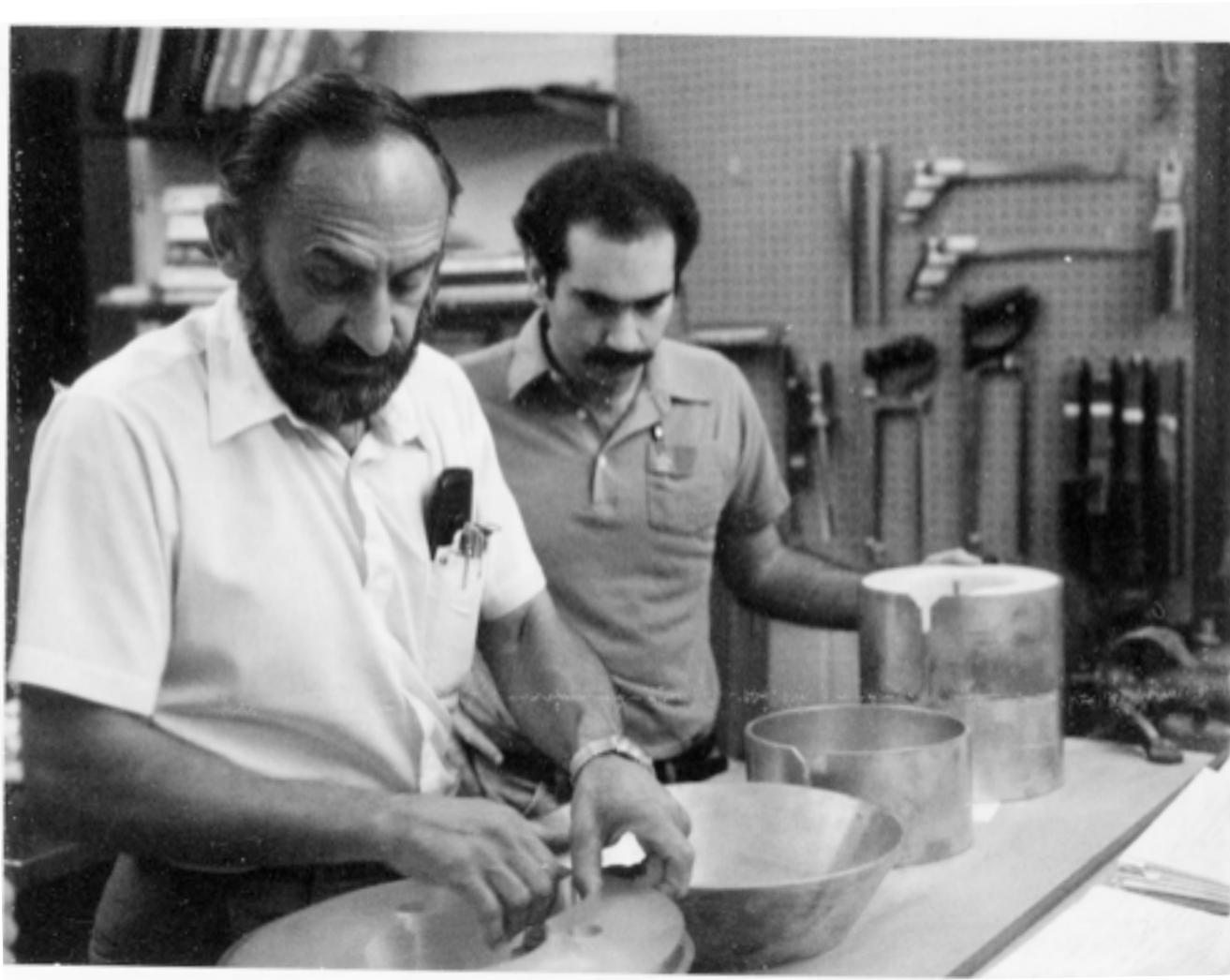


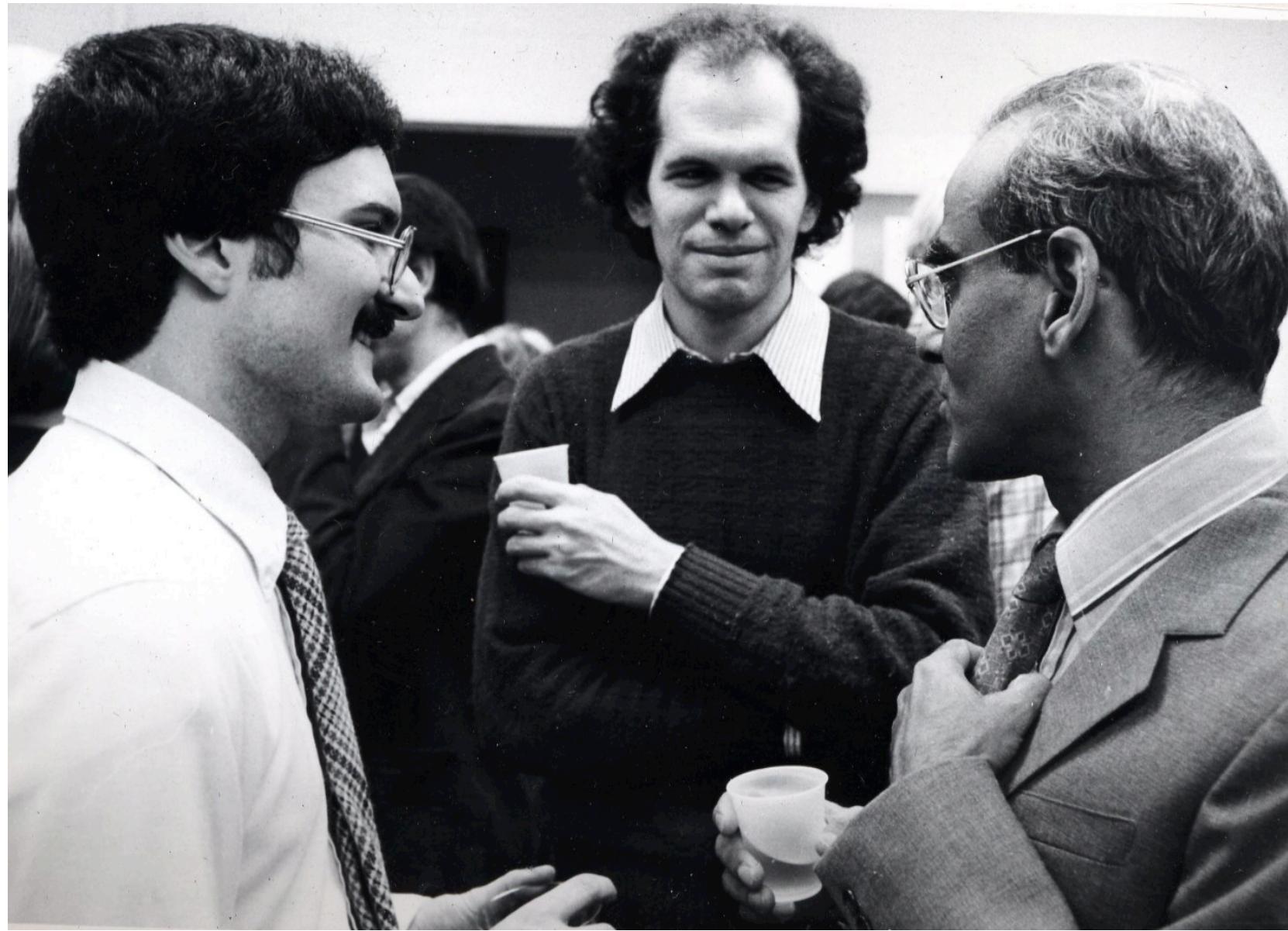






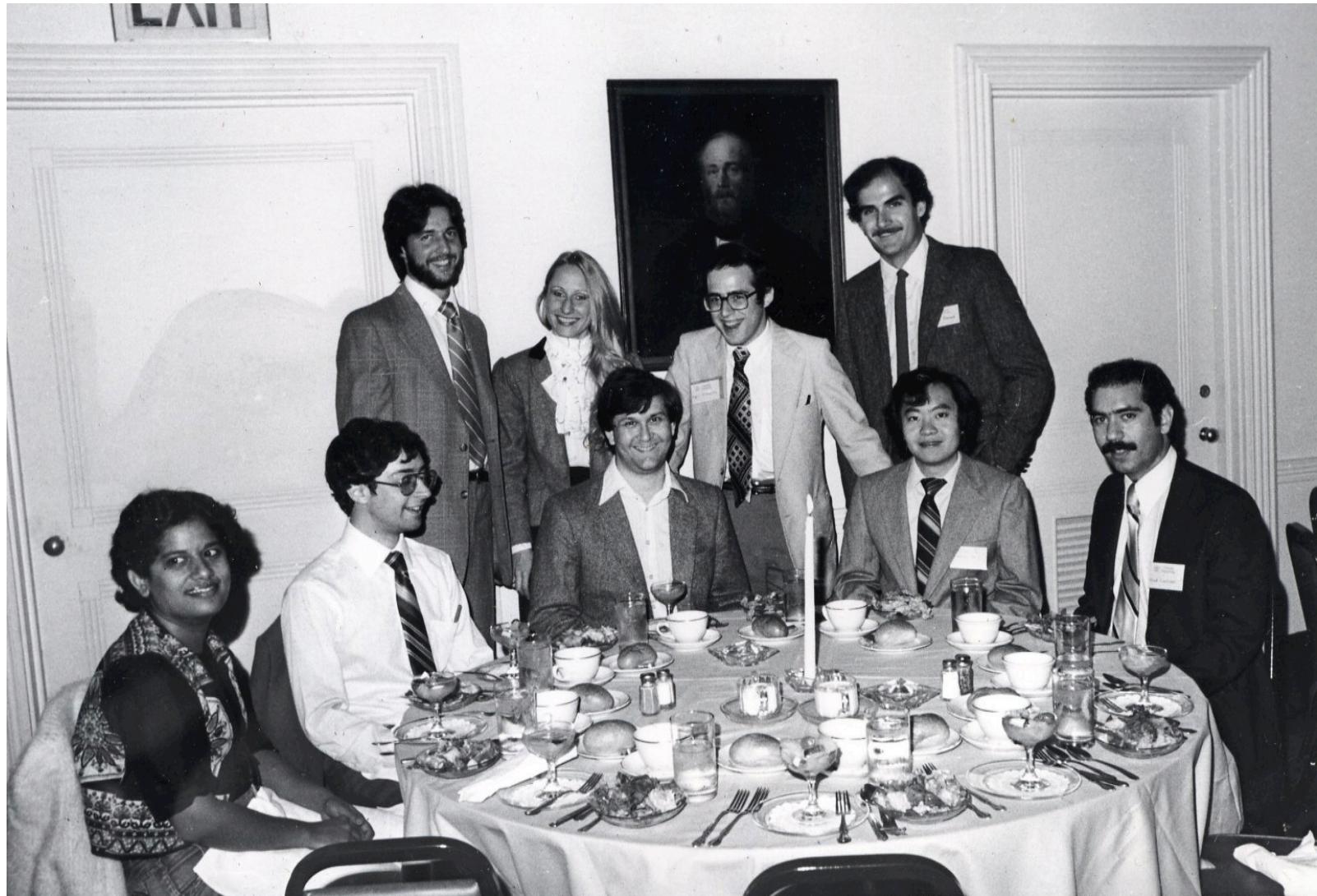








1987











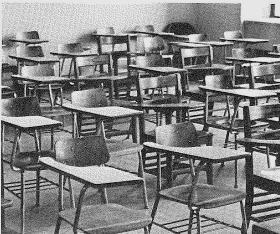
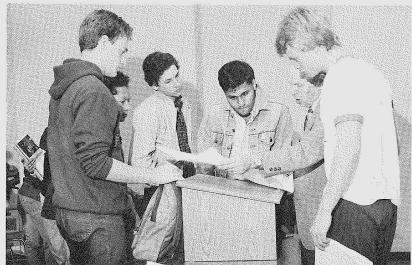








1987

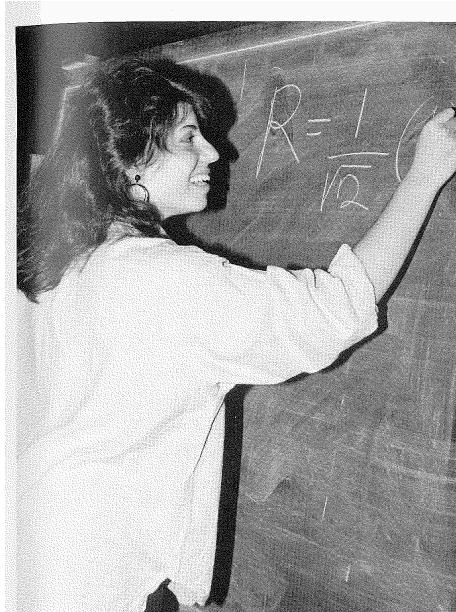


Professor Lidofsky counsels underclassmen in the art of Fortran programming. (top)

(above) A sign of the second floor.

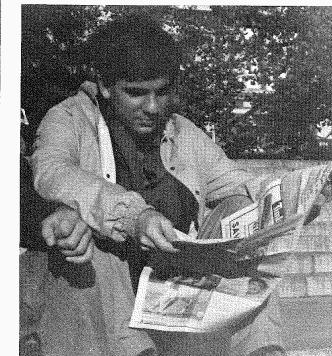


Tom Gellhorn contemplates the acceleration necessary for an electron to penetrate the wall of the Mudd building.



Quantum anyone? (left)

Alfredo Cubina searches the help wanted section for an applied physicist position. It is listed right after gene splicer, Fred.



APNE Department Faculty: (standing left to right) Michael Tabor, Thomas Marshall, Amitava Bhattacharjee, C.K. Chu (CHAIRMAN), Michael Mael, Alireza Sedaghat, (seated left to right) S. Perry Schlesinger, Irving Herman, Gerald Navratil, Herbert Goldstein, (missing) Leon Lidofsky

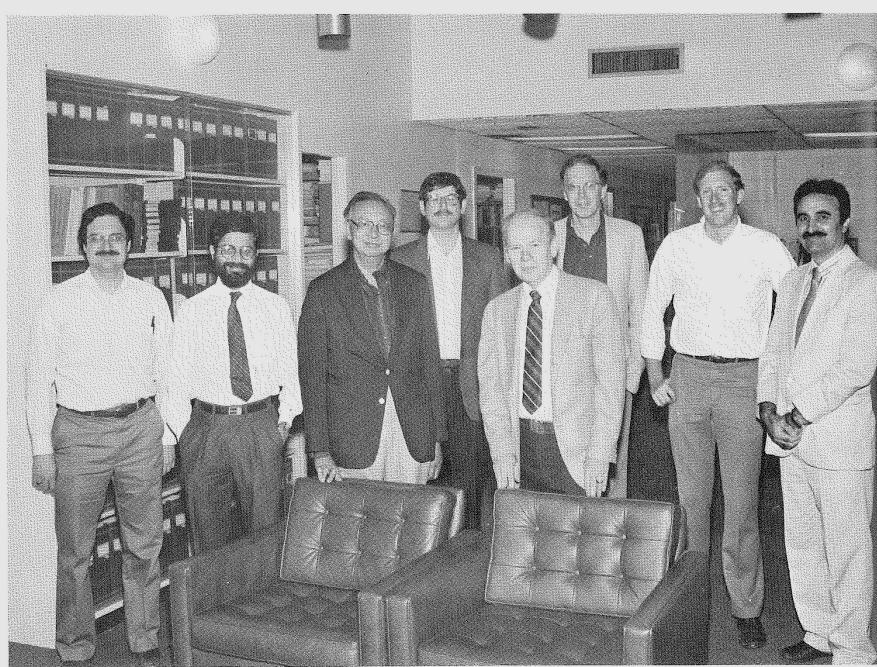




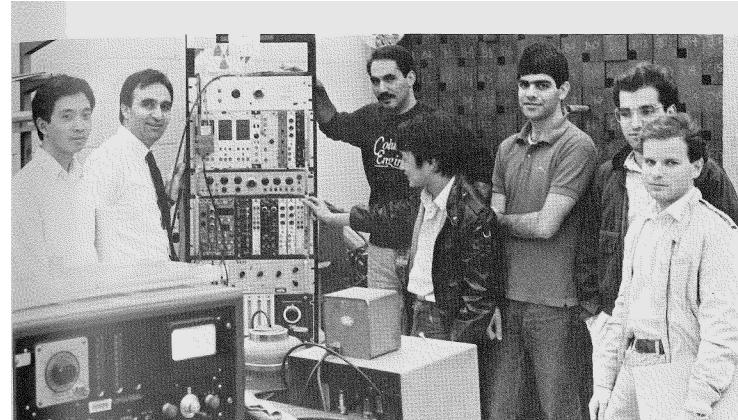




1988



APNE Department Faculty: (standing, left to right) Gerald A. Navratil, Amitava Bhattacharjee, C.K. Chu, Irving P. Herman, Leon Lidofsky, Thom Marshall, Michael E. Mauel, Alireza Sedaghat; (missing) Herbert Goldstein, Michael Tabor.



So, does anyone know how to work this gadget?

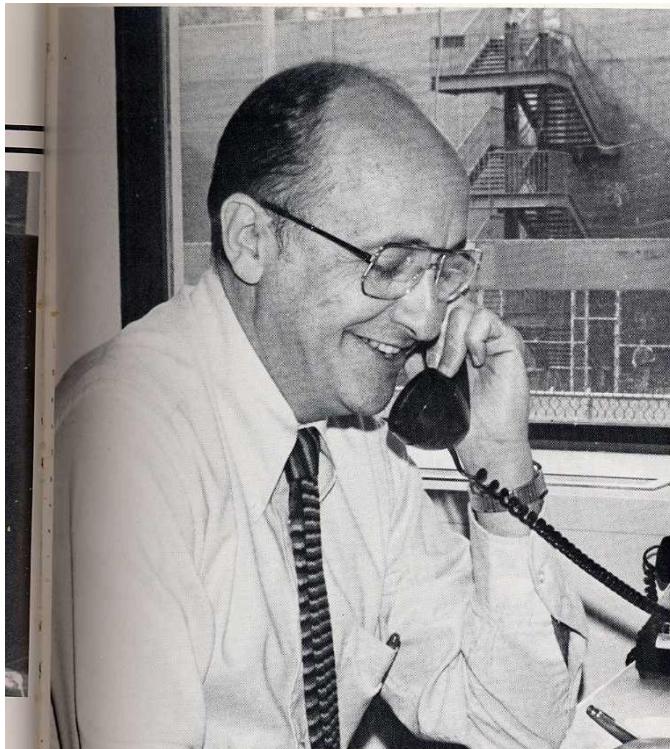


Department Staff: (seated, left to right) Lois Winter, JoAnn Winsten; (standing, left to right) Marlene Arbo, Lydia Argote.

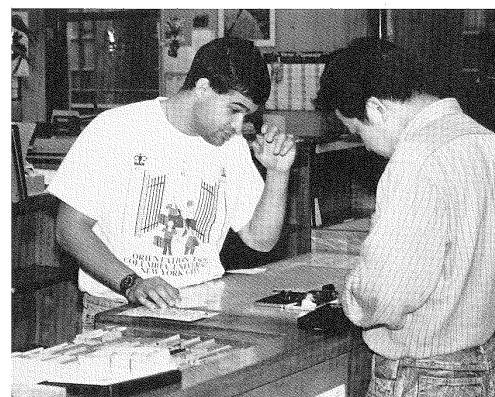
are conducting in the facilities available to the APNE Department. These include a Tokamak, a FEL, a fission reactor, extensive computer systems on campus, as well as the use of the resources at Brookhaven and Nevis Labs.

With one of the best equipped departments in SEAS, and some of the greatest research talents to aid us in our education, we seek not to build or to manufacture, but to understand.

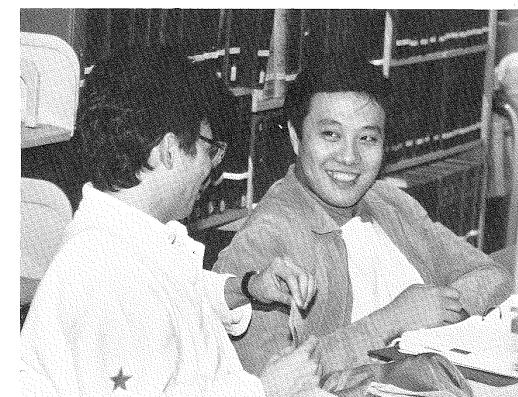
1989



APNE Faculty: (standing left to right) Leon Lidofsky, Gerald A. Navratil (Chairman), C.K. Chu, Amitava Bhattacharjee, Michael Tabor, Peter R. Eiseman (seated left to right) Herbert Goldstein, Thomas C. Marshall, Irving P. Herman, Michael E. Mauel

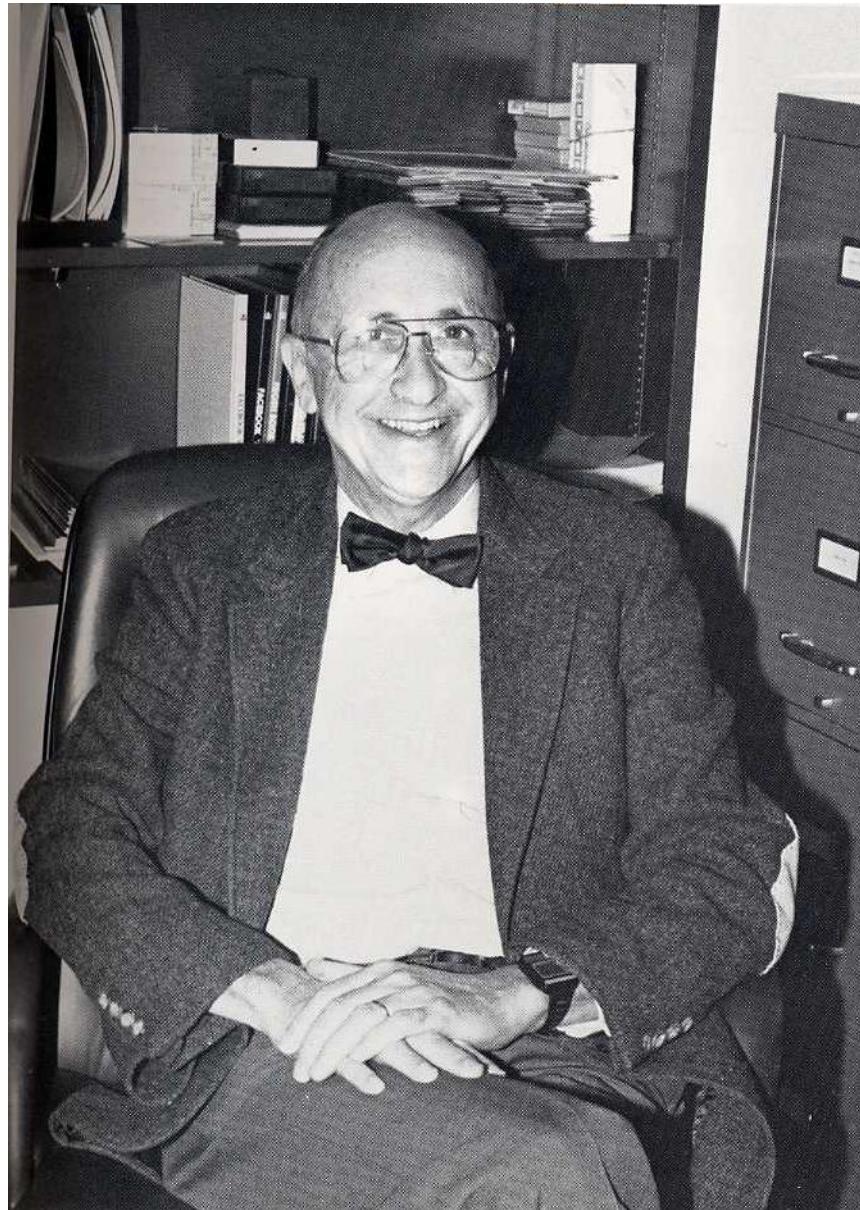


No! No! Not that way. Don't you know how to fill out a card yet?
0

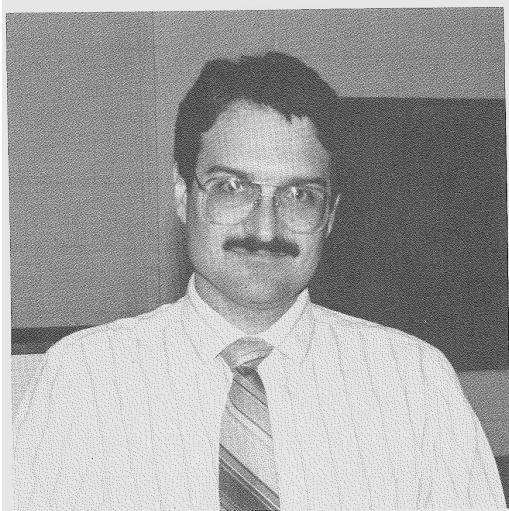


Don't tell me you spent all night studying Physics with her . . .

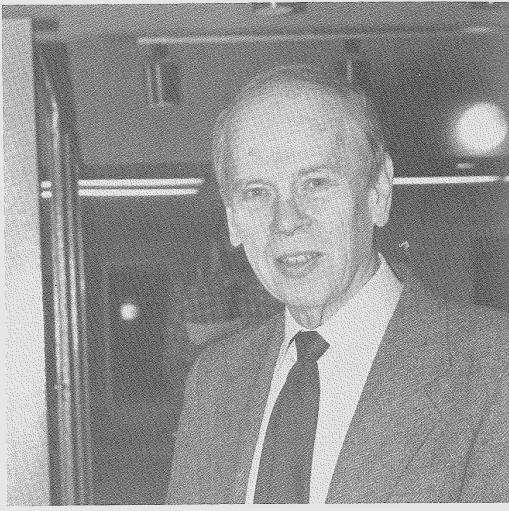
1989



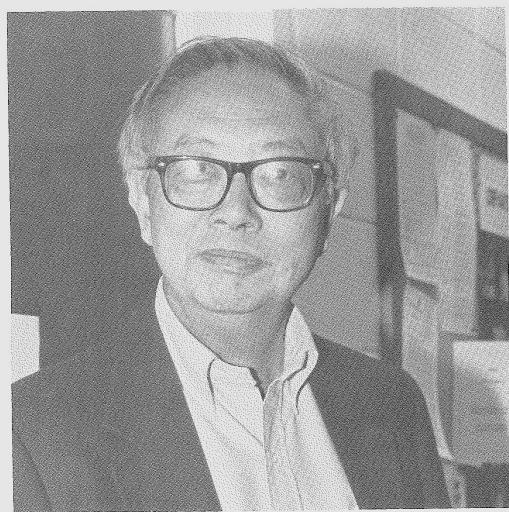
1990



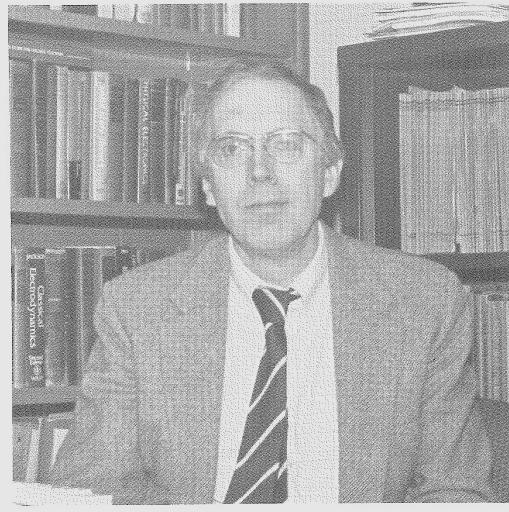
Gerald Navratil



Leon Lidofsky



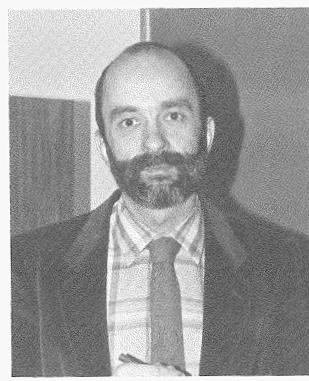
C. K. Chu



Thomas Marshall



Michael Mauel



Michael Tabor



Amitava Bhattacharjee



Marlene Abo

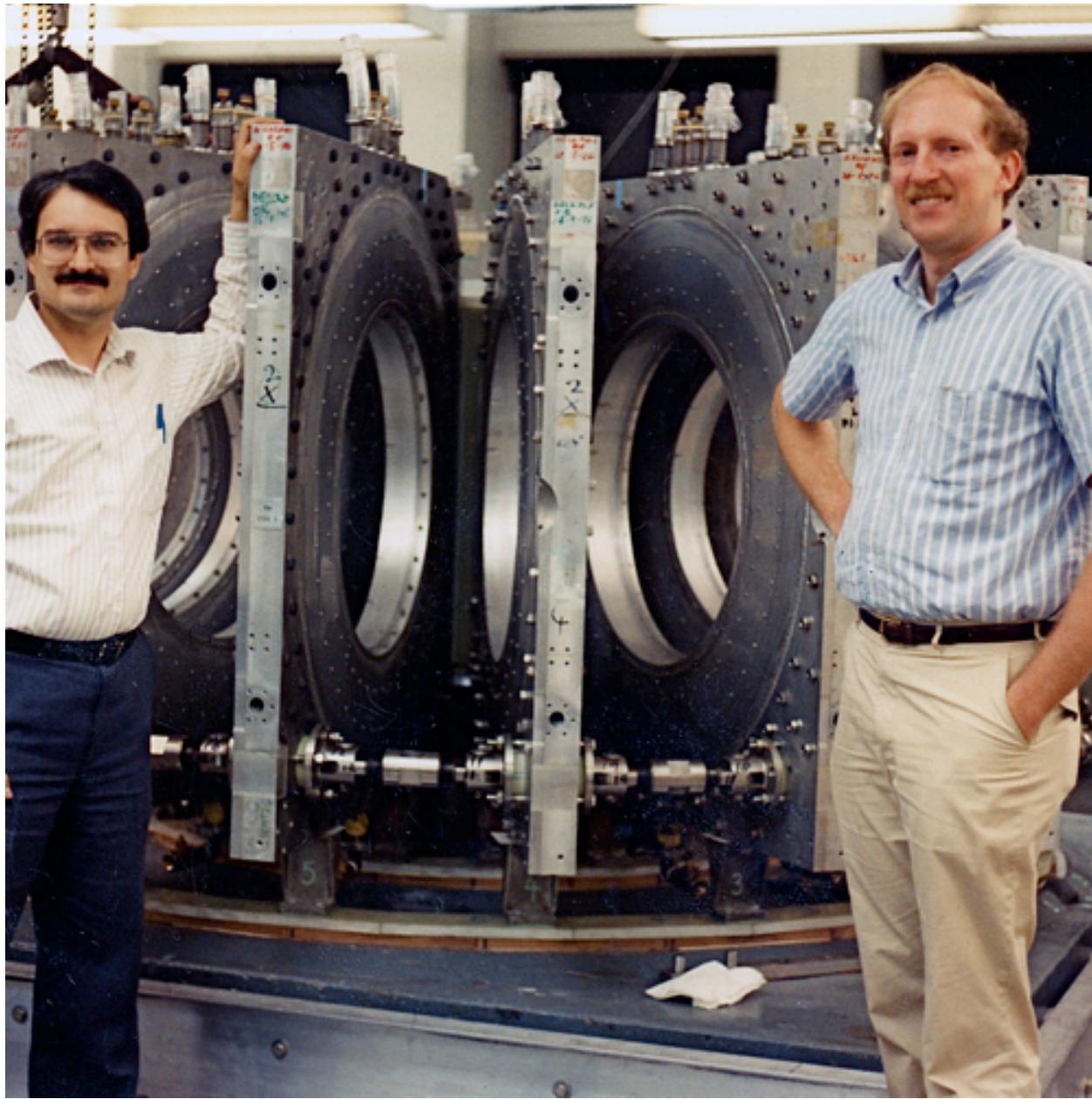


JoAnne Winstein, Lois Winter

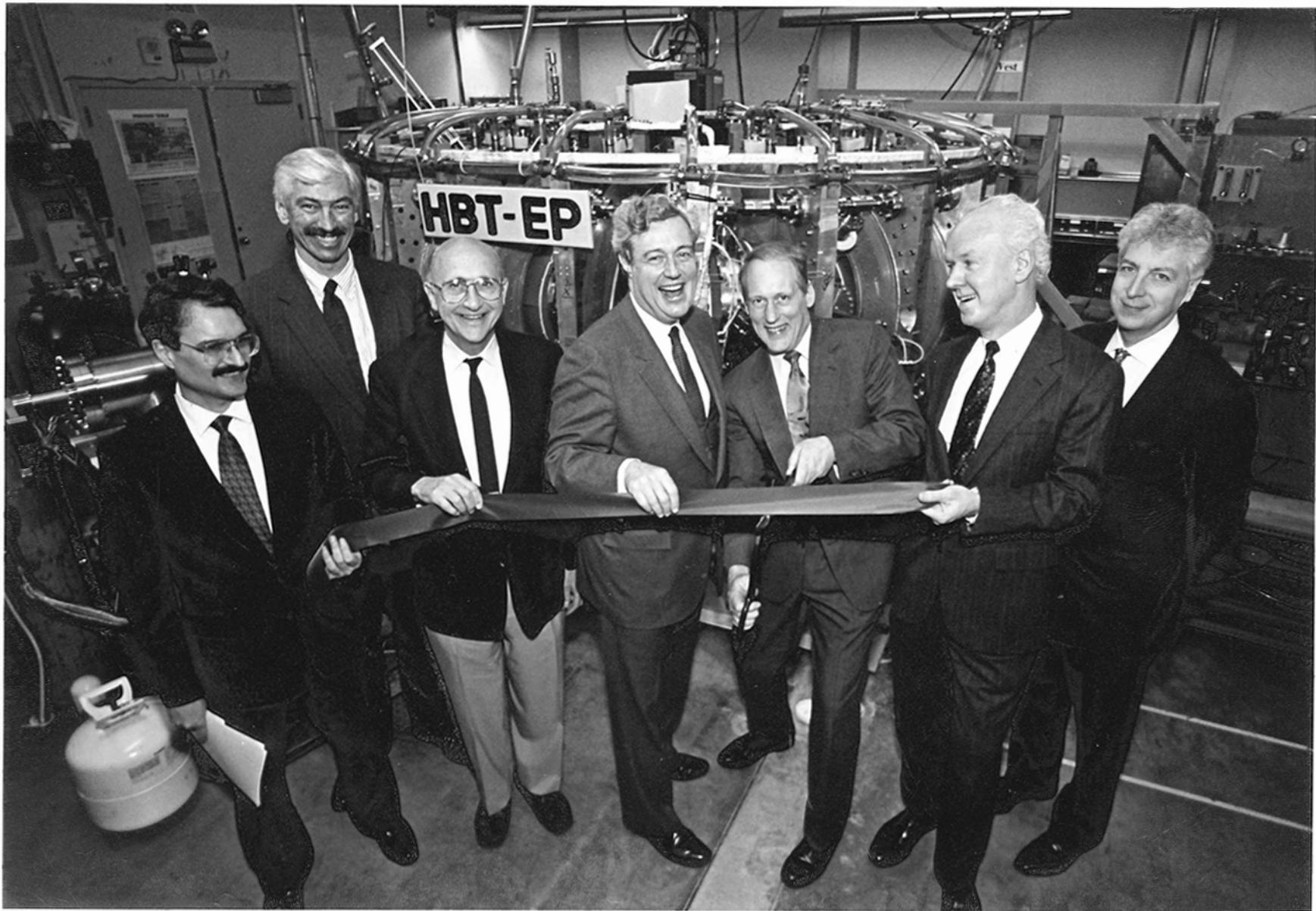


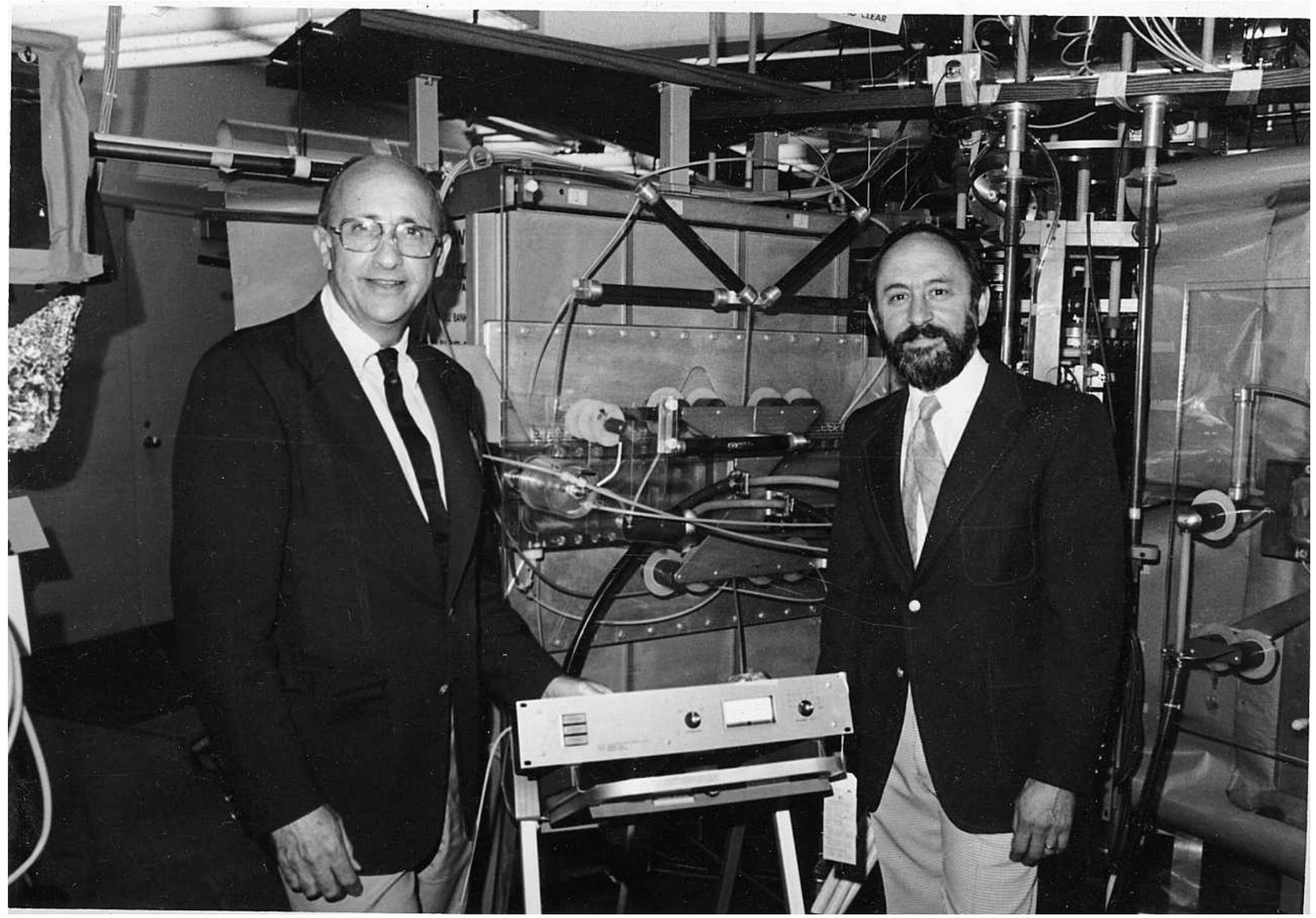


1990



1991-1933

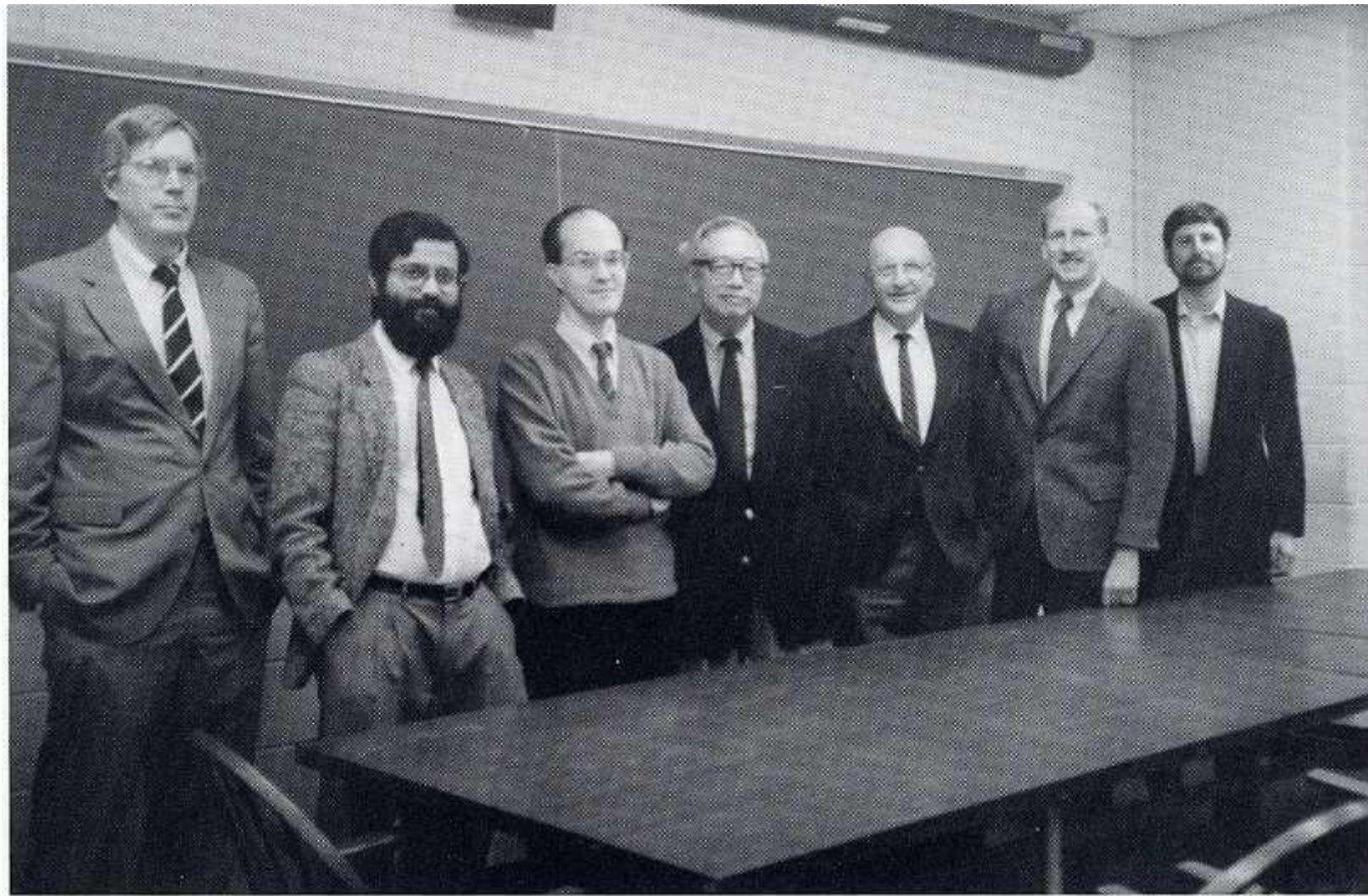


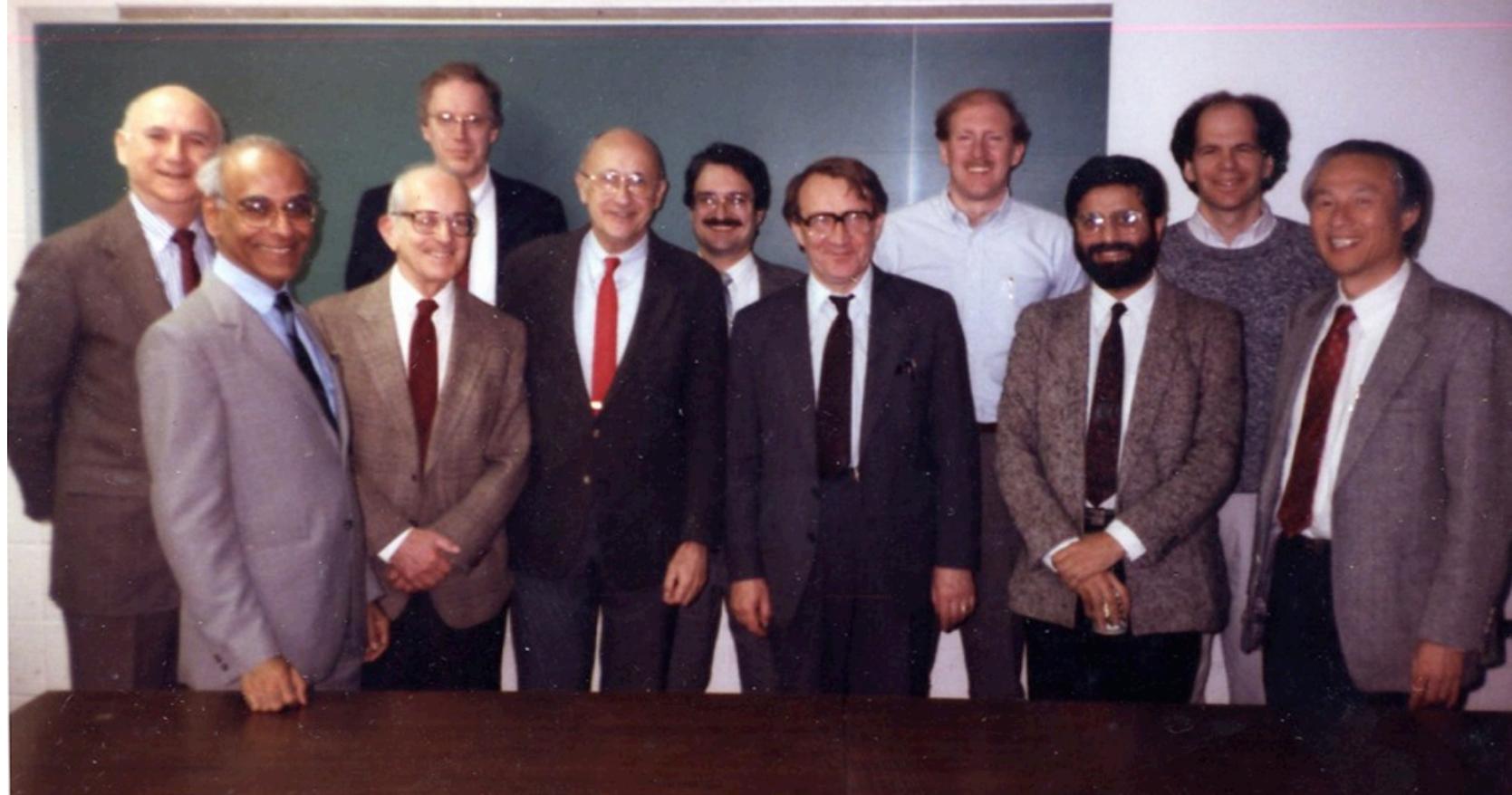


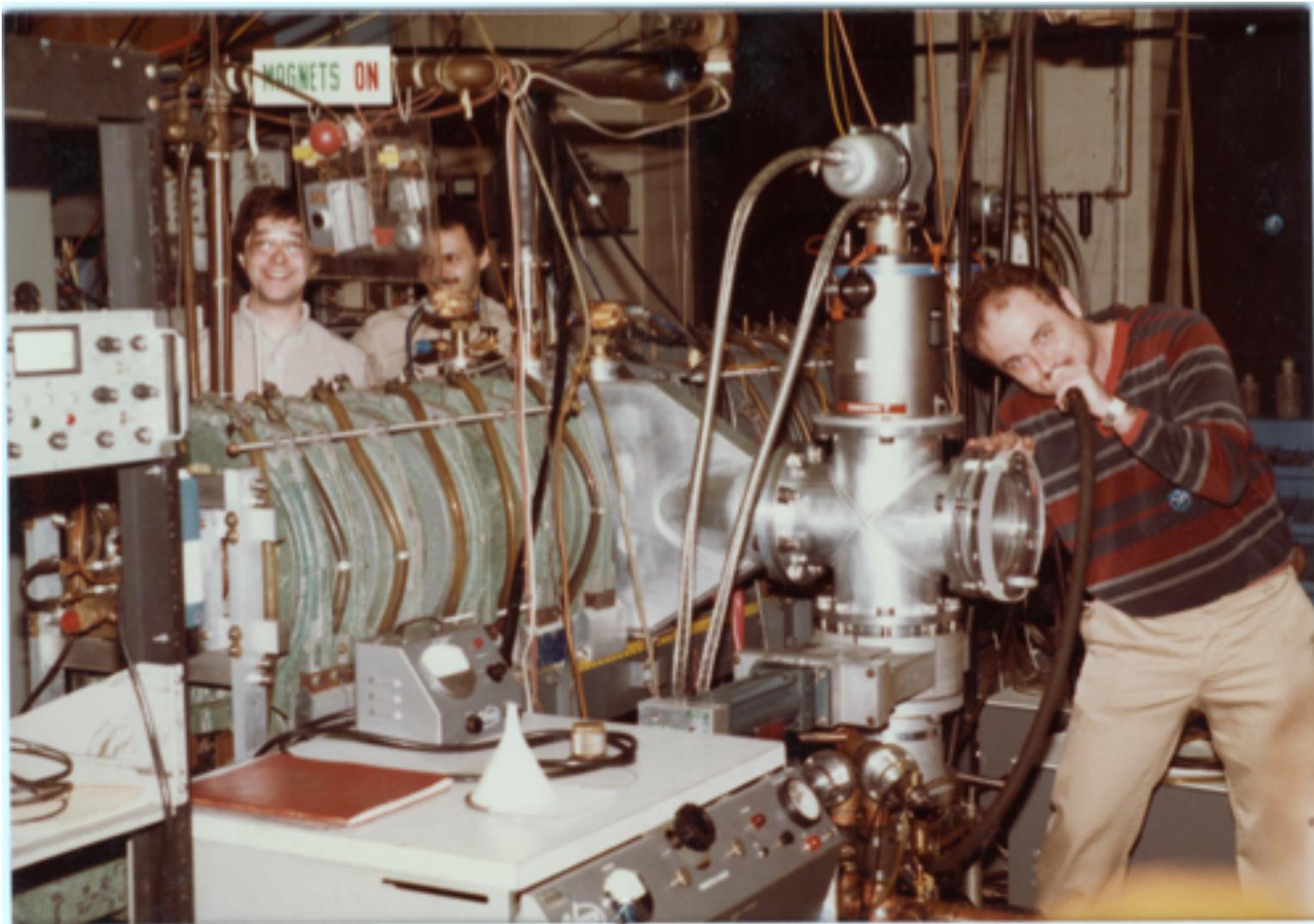
1991



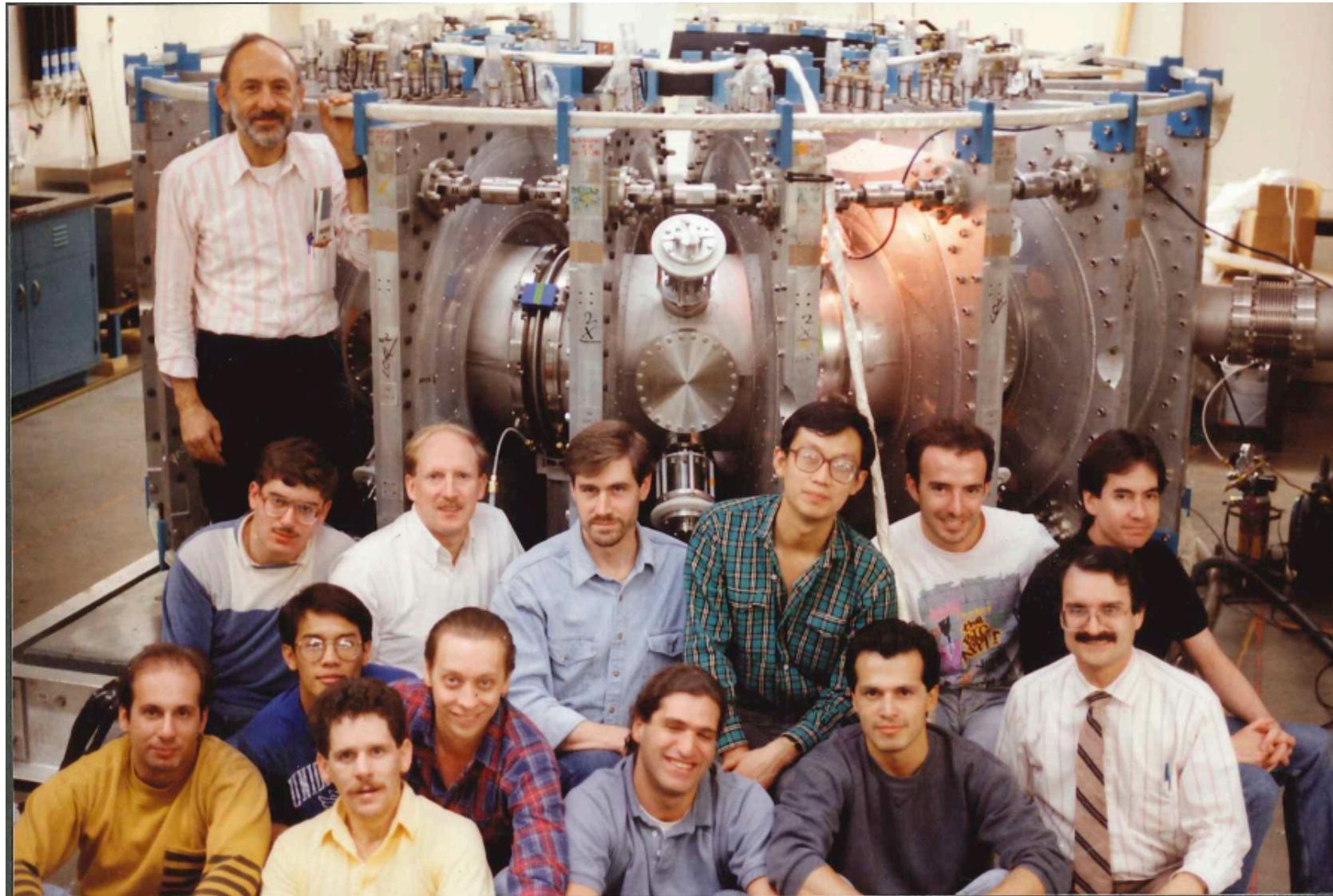
1993





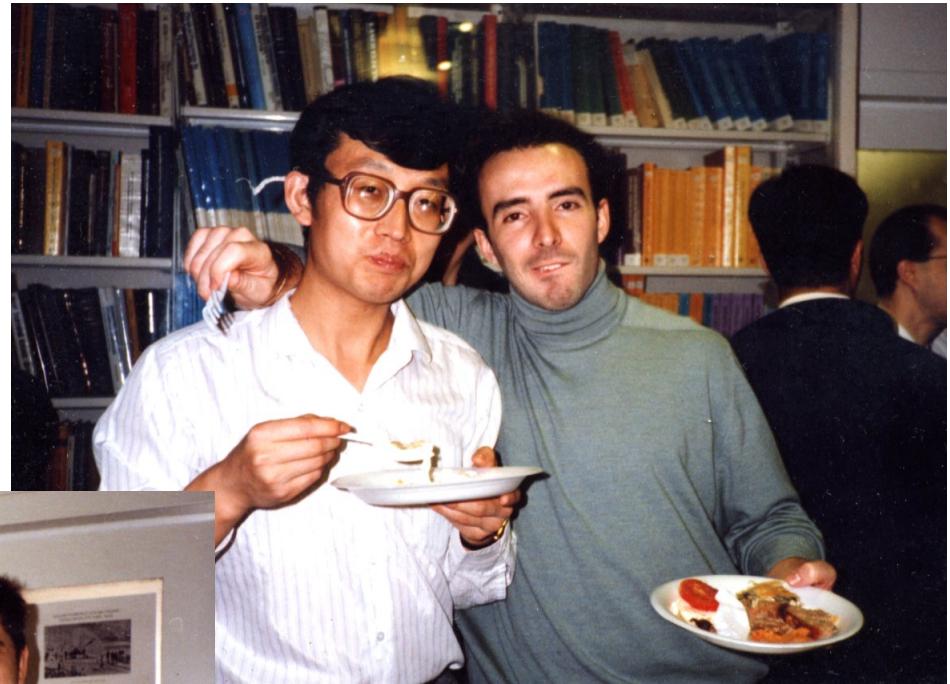


1991-1993

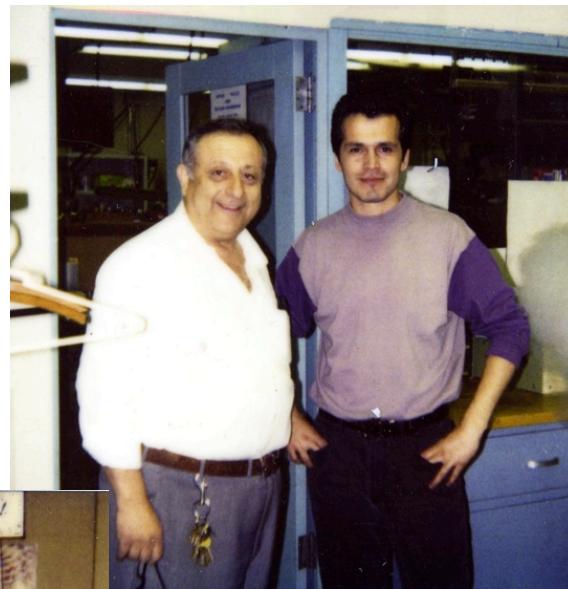




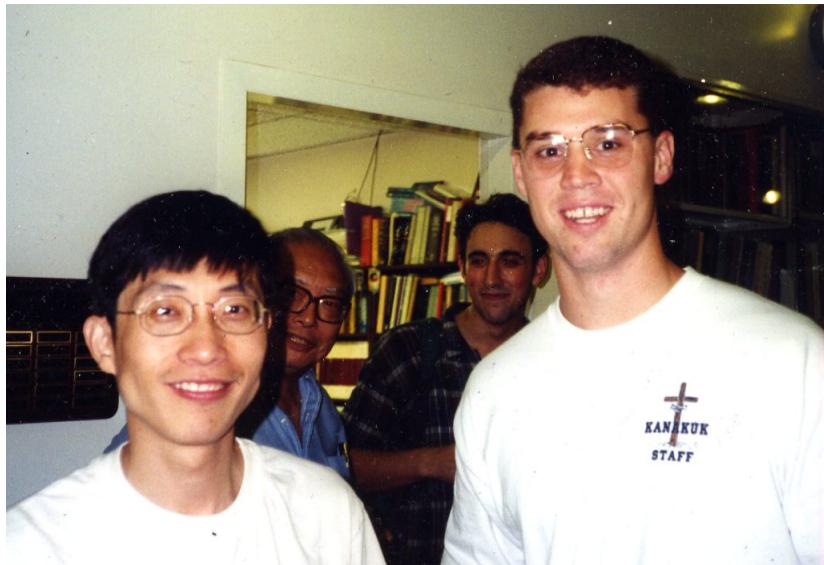
1991-1993



1991-1993









1991-1993





MACWORLD

April 1989

The Macintosh® Magazine

make it come true. The company's HyperAnimator lets you print or scan in faces and type whatever you want to say; the text is automatically converted to speech synchronized with the lip movement. Mom's voice won't sound like hers, however, unless you can get her to digitize it for you on the disk. If you type in her words, she'll sound distinctly computerish. If you don't have time to draw or type, you can use the staine characters provided by BrightStar.

HyperAnimator's best addition, however, is probably a talking head star—Disney's new version of "Absent-Minded Professor," shown Sunday nights as part of "The World of Disney" TV series. Software developers Jay and Harry Anderson and Albert play the program's electronic sidekick. BrightStar has also added the animator's audio feature to its mail package called Mail, which lets your coworkers deliver their messages in person. HyperAnimator lists for \$199. For further information, contact BrightStar Tech in Bellevue, Washington, 206/885-5446. —Ann Garrison

looks like rings of lightning and lasts for 200 millionths of a second each time it appears. During every flash of the lightning ring, laser beams and magnetic sensors measure the dynamics of the ring at least once every millionth of a second, producing more than a megabyte of data.

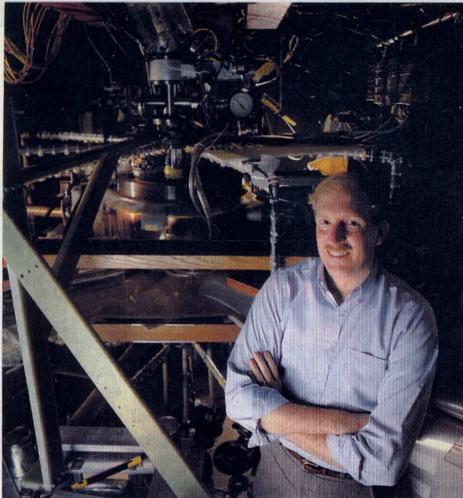
The data is digitized, loaded into VAX computers, transferred to Macs, and then analyzed with TokaMack, an application Mael offers using Apple's Macintosh Programmer's Workshop (MPW) and MacApp. The analysis also involves four Cray computers.

hydrodynamic instabilities, called kinks, occurring in the plasma ring at very high pressure.

TokaMack is named after Tokamak, an earlier device developed by the late Russian physicist L. A. Artsimovich for magnetically confining ring lightning. Mael offers the software as freeware to scientists doing similar research throughout the world. TokaMack requires a Mac II.

For further information, contact Michael Mael at Columbia University, at 212/854-4455.

—Ann Garrison



JOSEPH LEVINE

Columbia professor Michael Mael leads a team using Macs to test the use of magnetic force fields to confine hydrogen plasma.

81 Macworld News

■ **Beyond HyperCard** Two companies prepare more powerful HyperCard clones.

■ **New MacWrite and MacDraw** In addition to new versions of the old standbys, Claris introduces Claris CAD and the SmartForm Series.

■ **And Now Presenting... PowerPoint and More II** connect to slide-making services for quick turnaround.

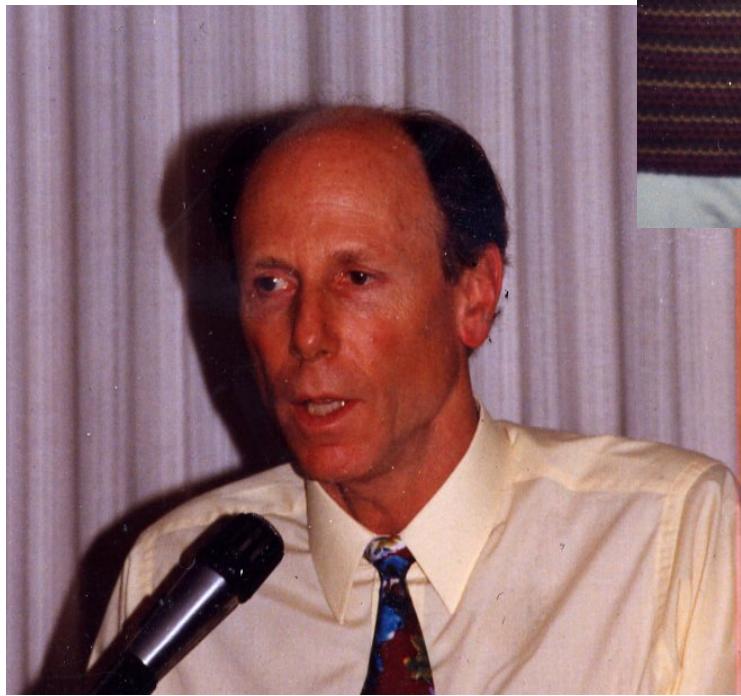
■ **E-Mail Support Grows on Vines** A Mac electronic-mail gateway links VINES Network Mail and QuickMail.

■ **TokaMack** Columbia University uses a Mac program in fusion research.

Plus, Jasmine's new BackPac with modem support, SE/30 color card, medical imaging, C++ and a new MPW, and more.

aMack

The U.S. Department





1991-1993





1994-1996



1993-1996



1994-
1997





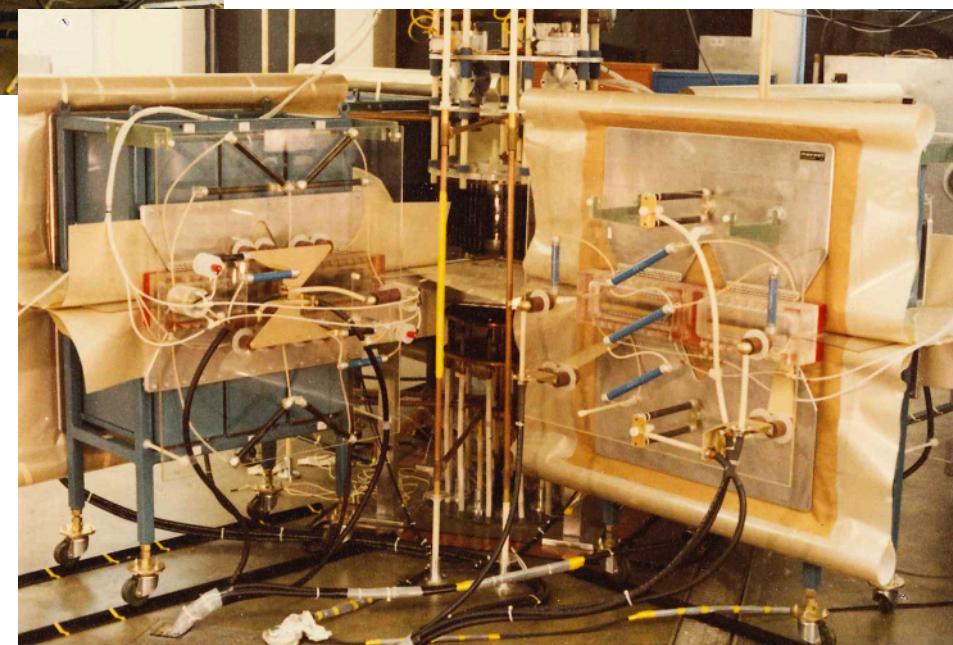
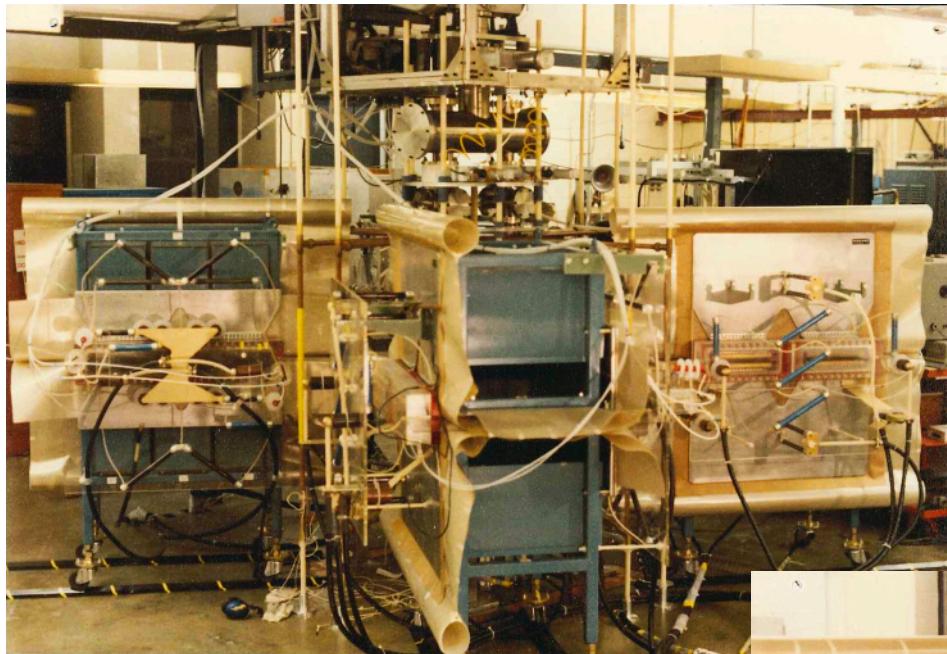


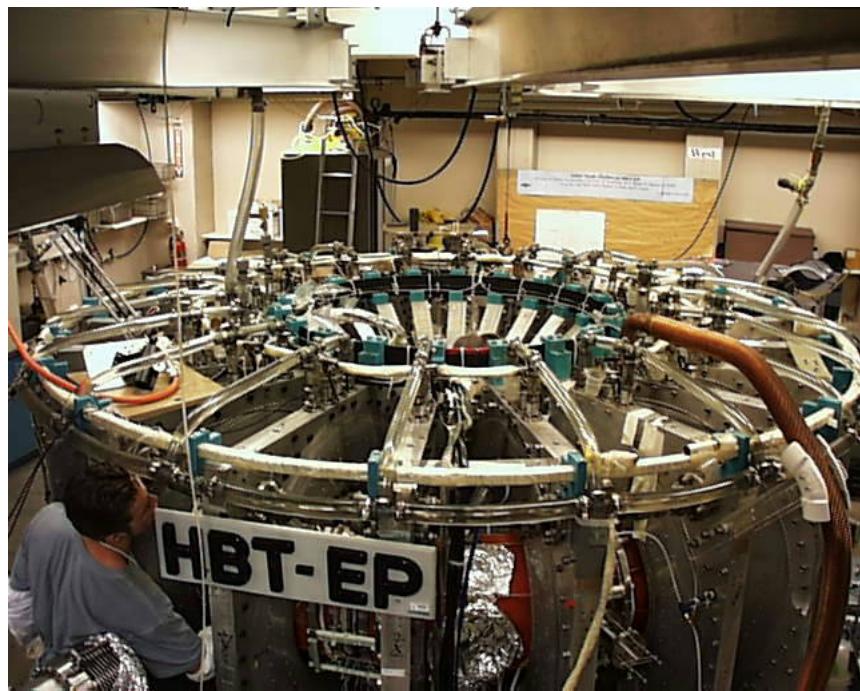
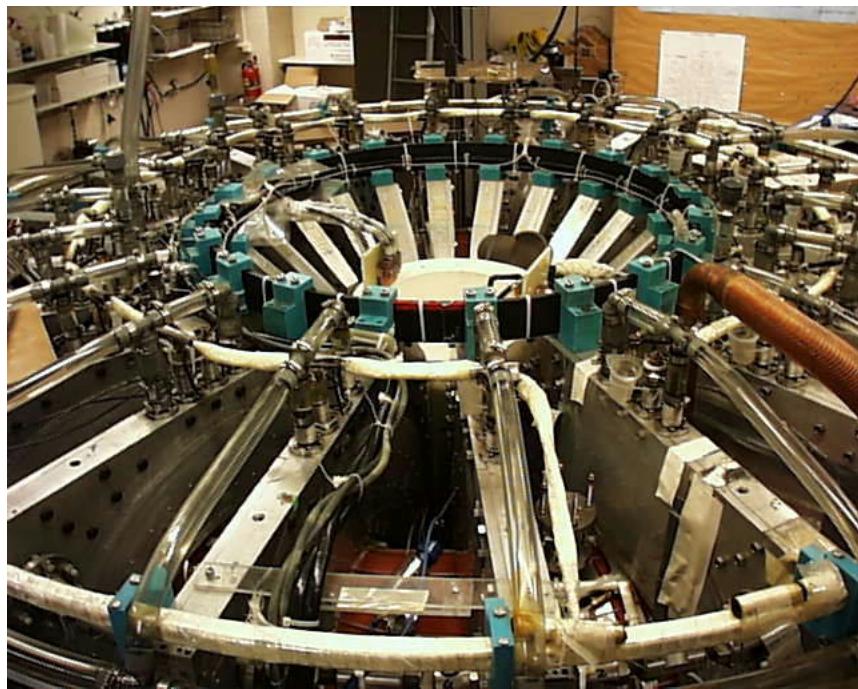
1996-1999

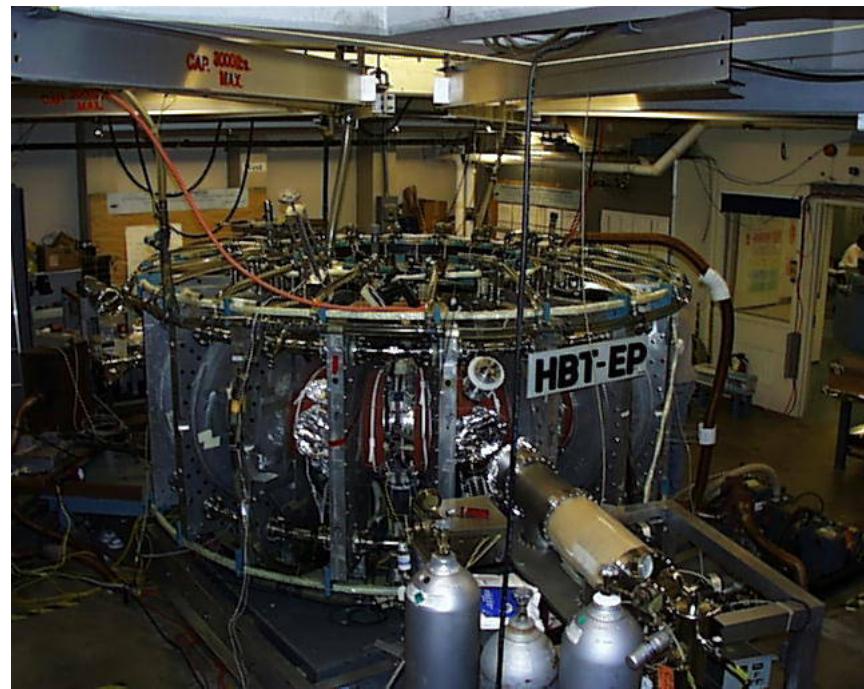
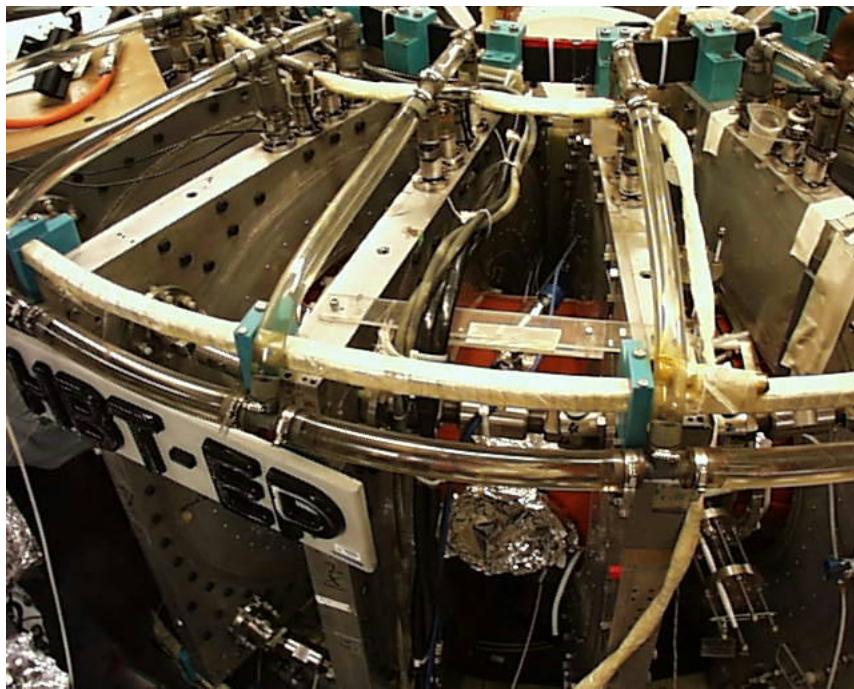




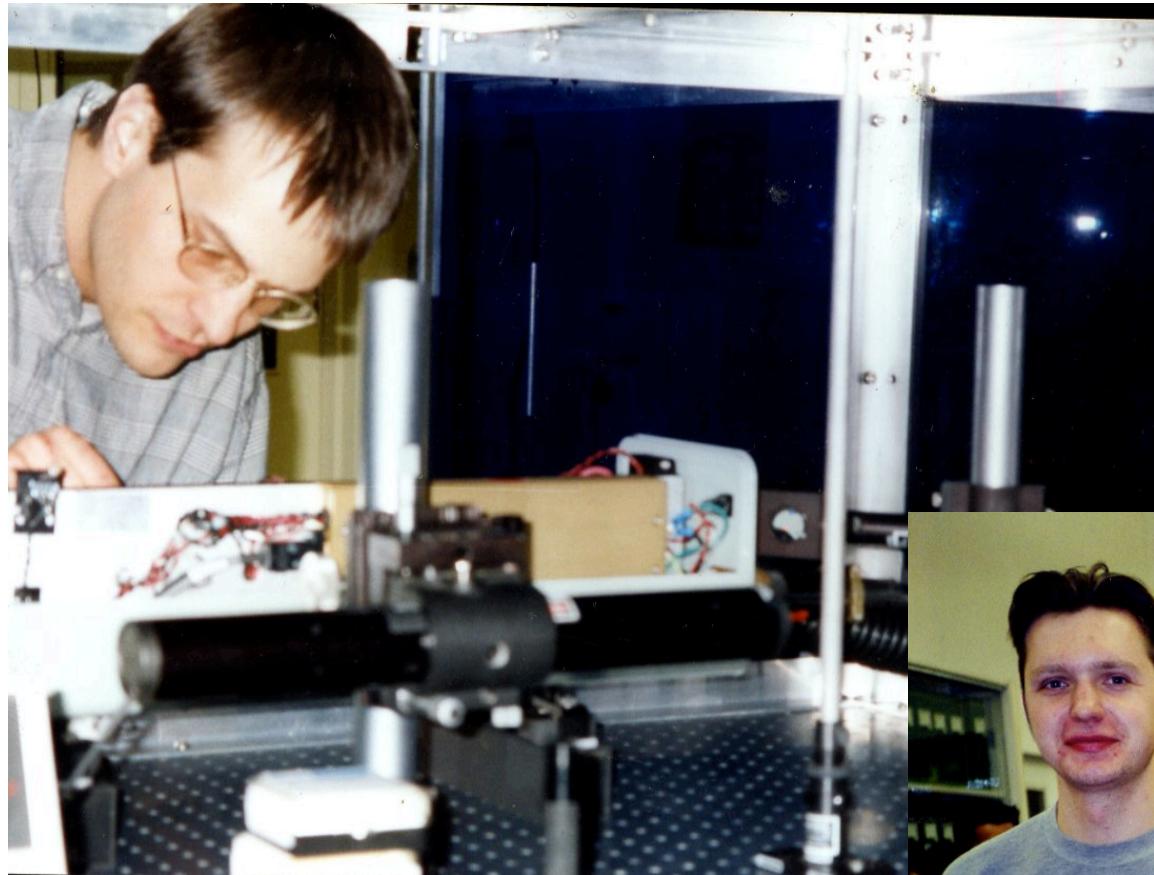


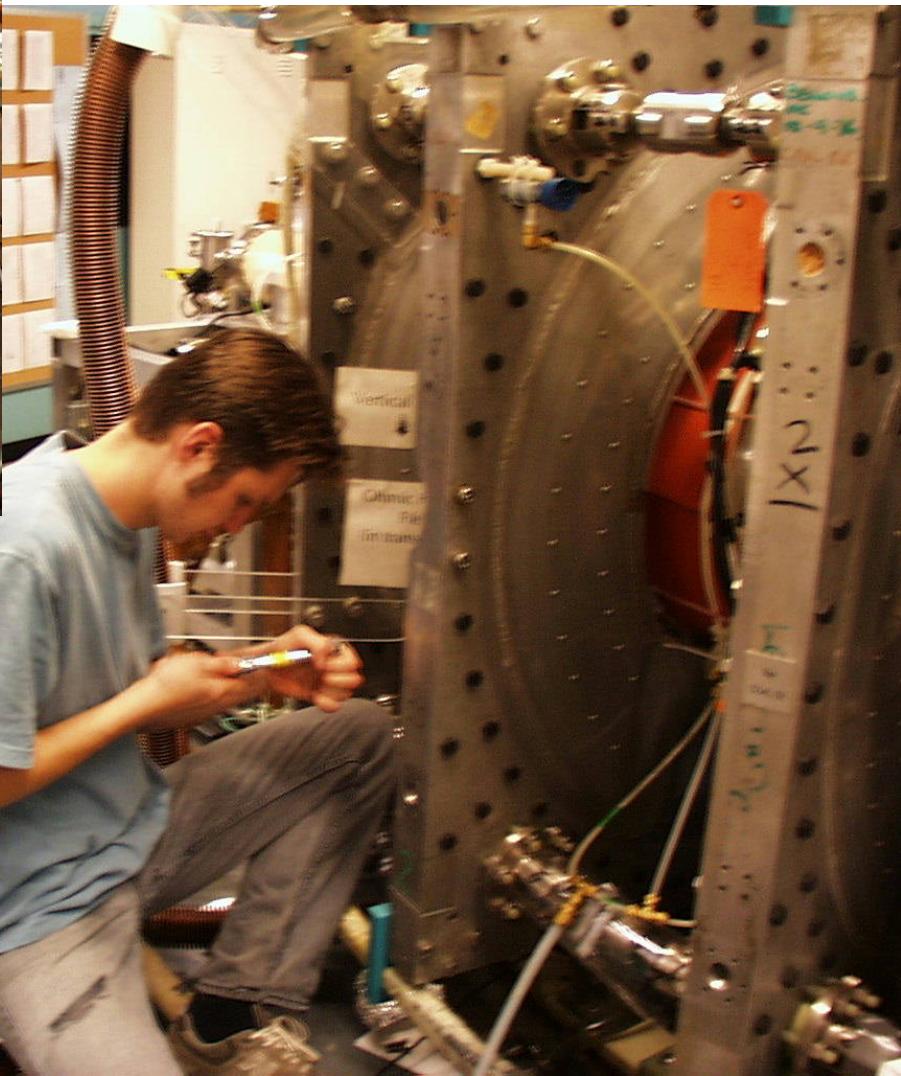
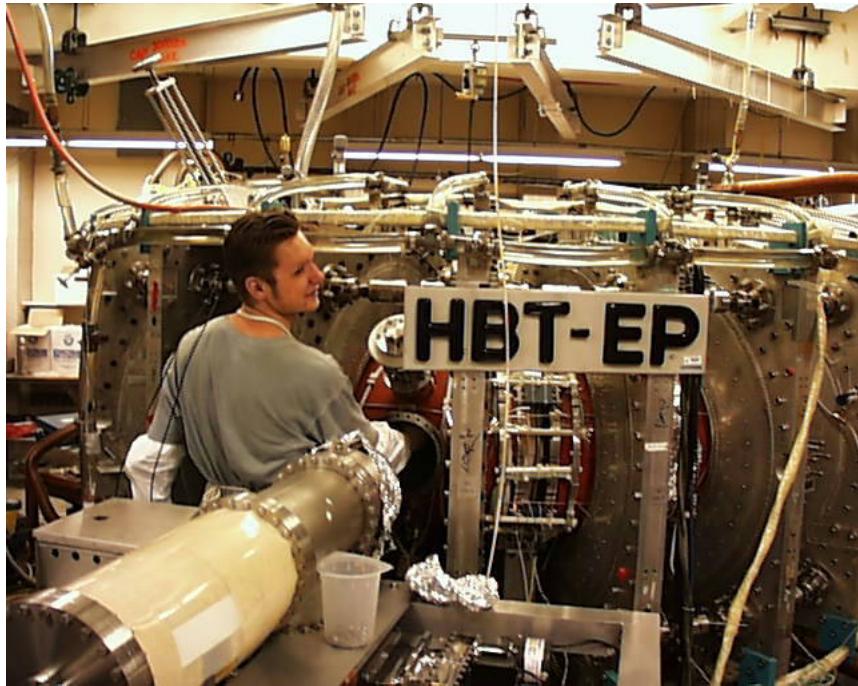


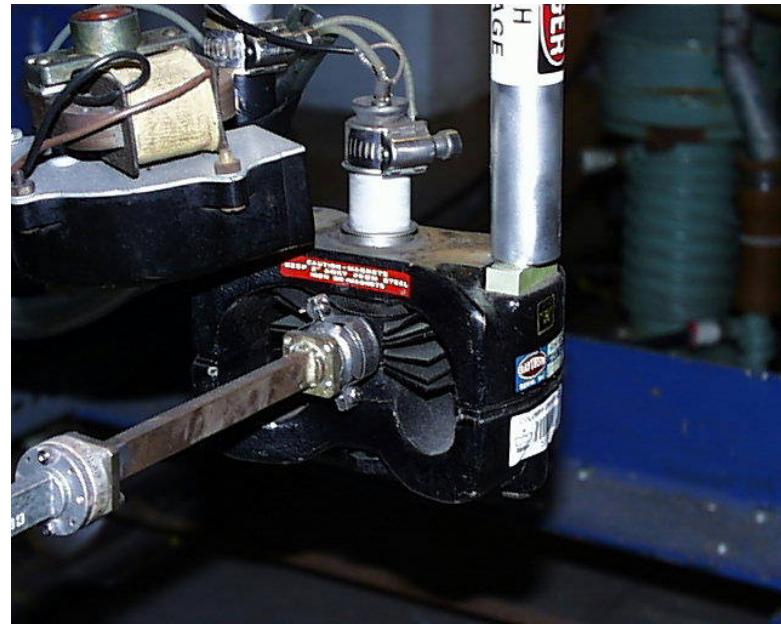
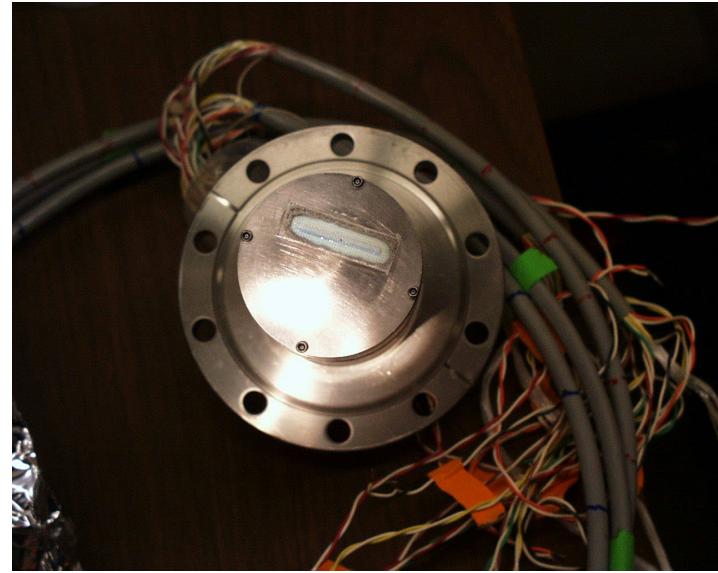


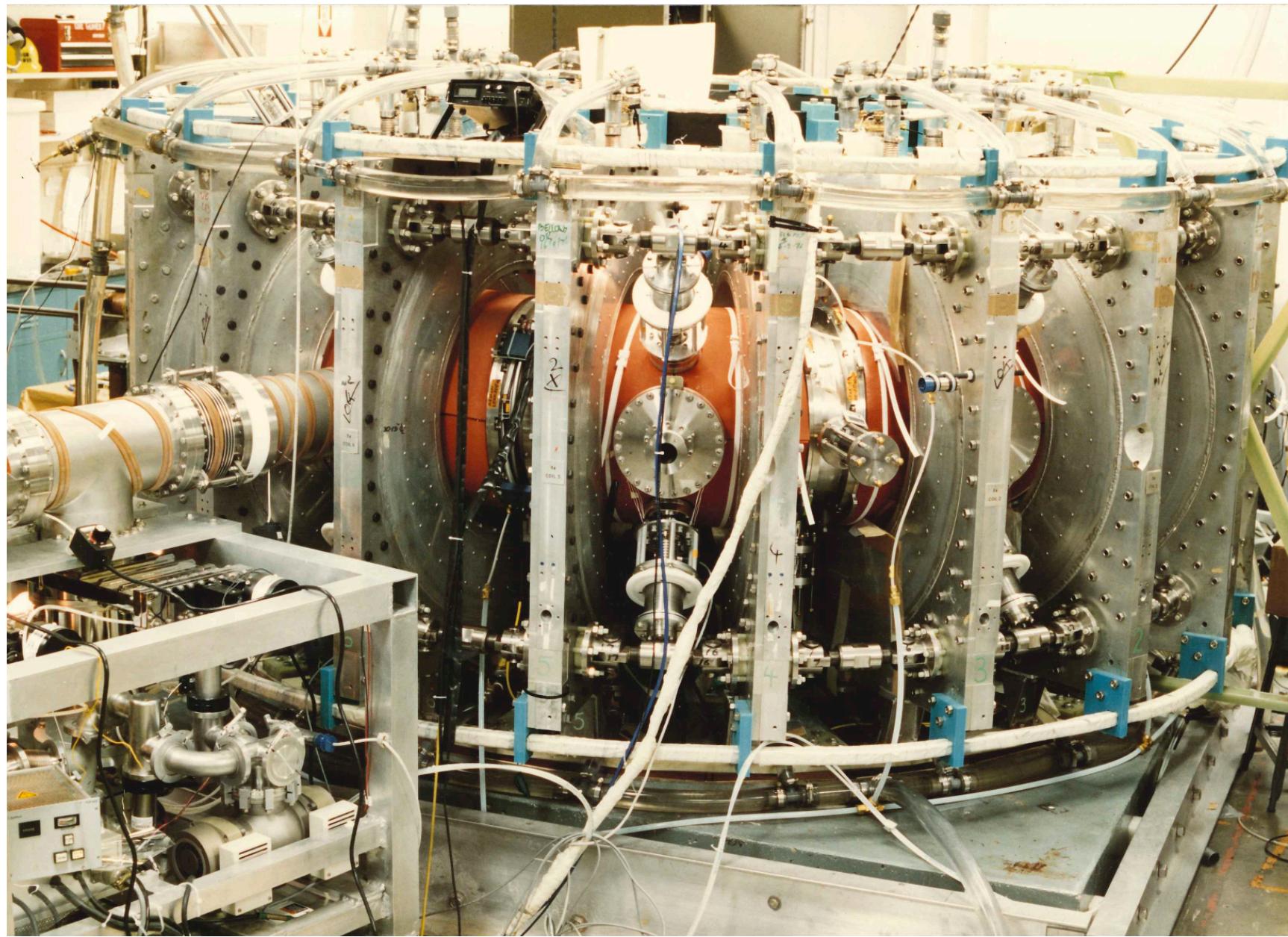


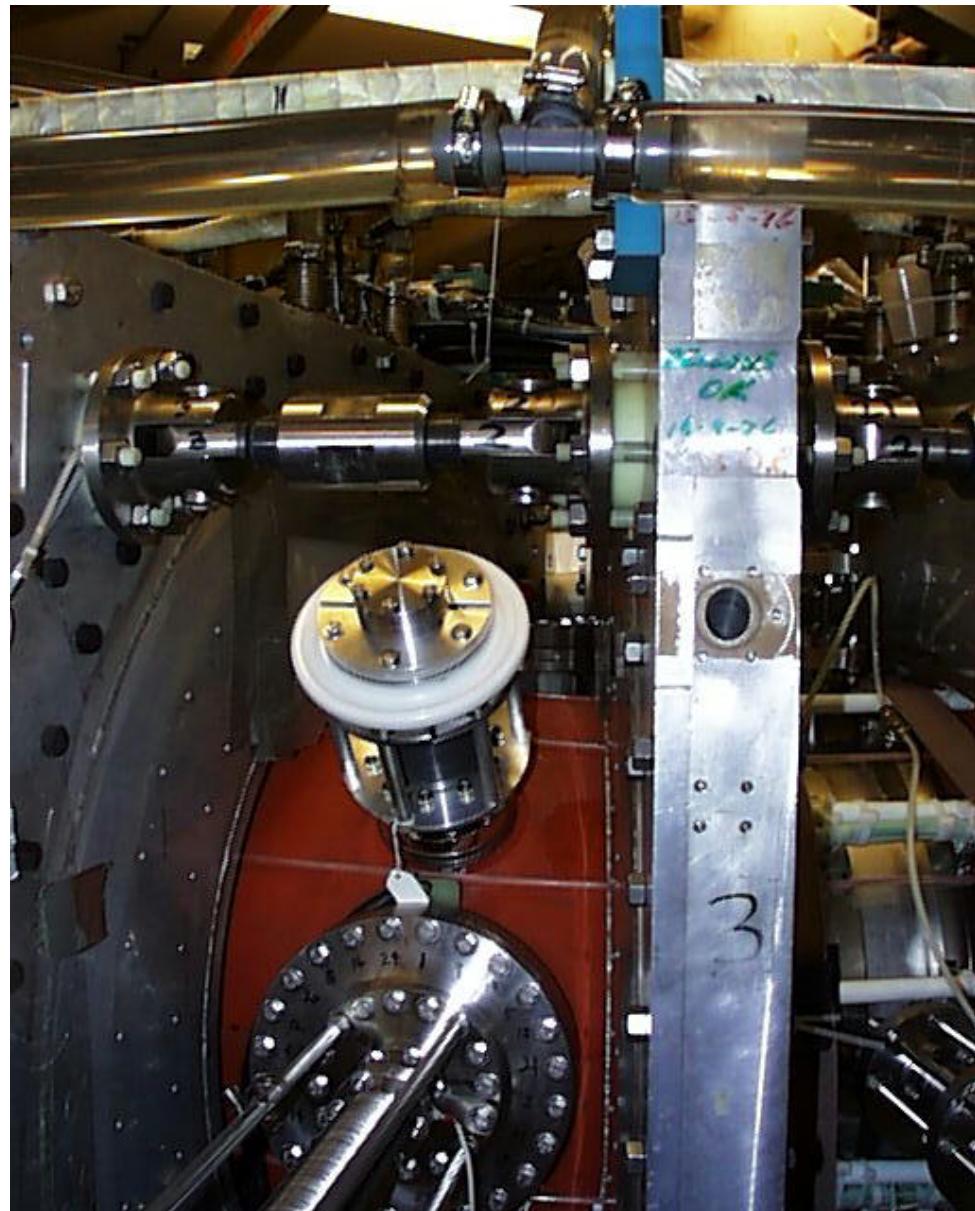
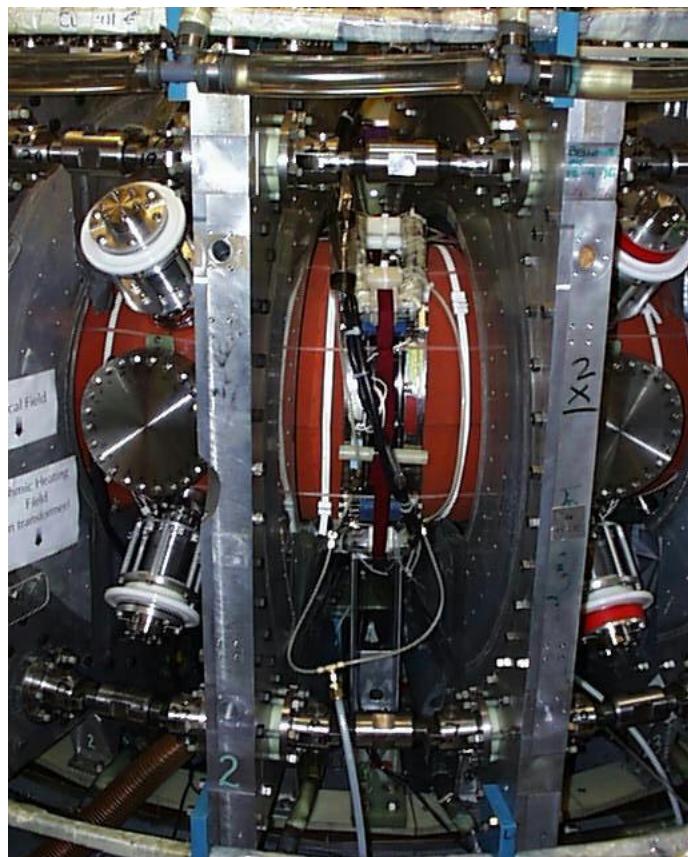


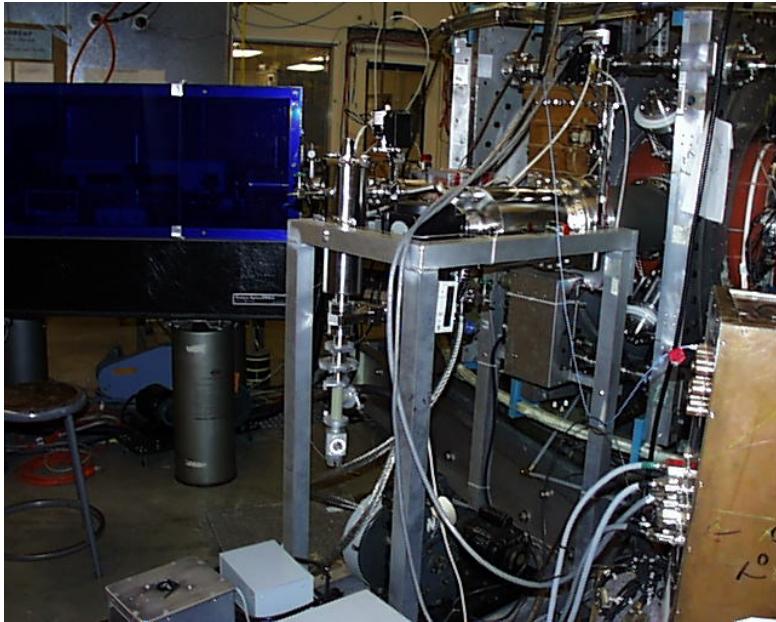


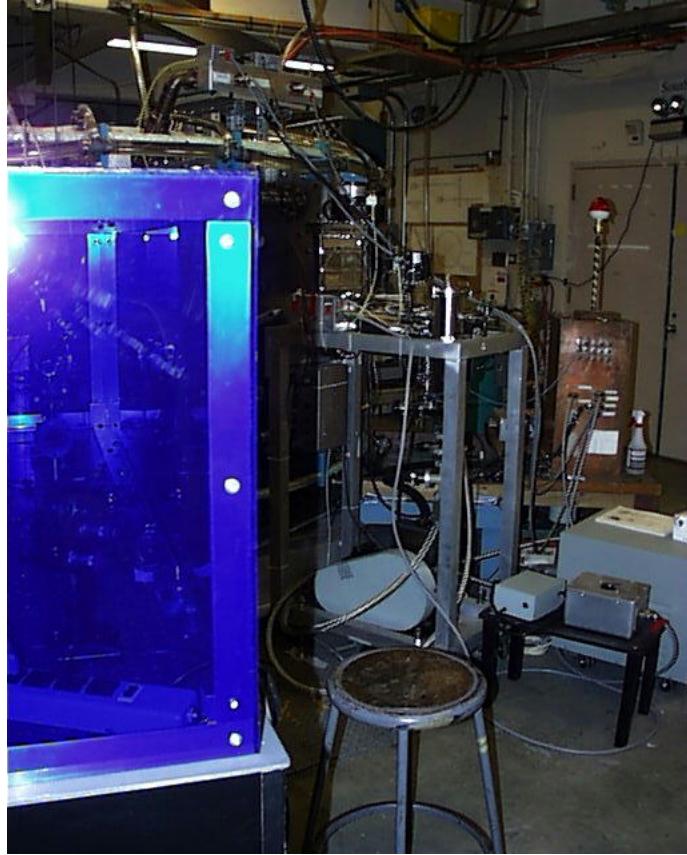




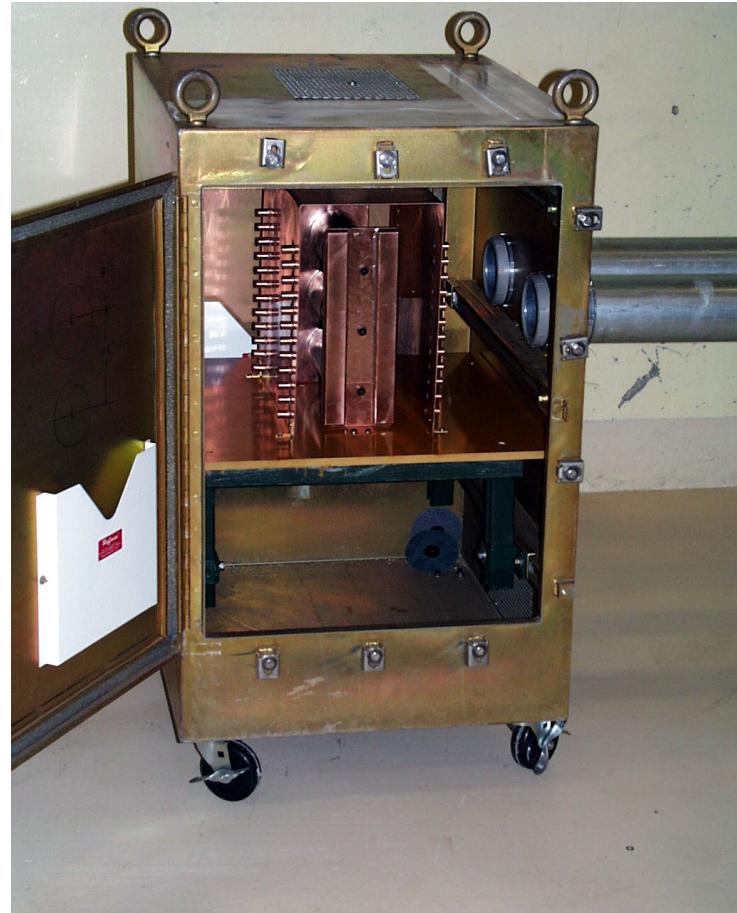




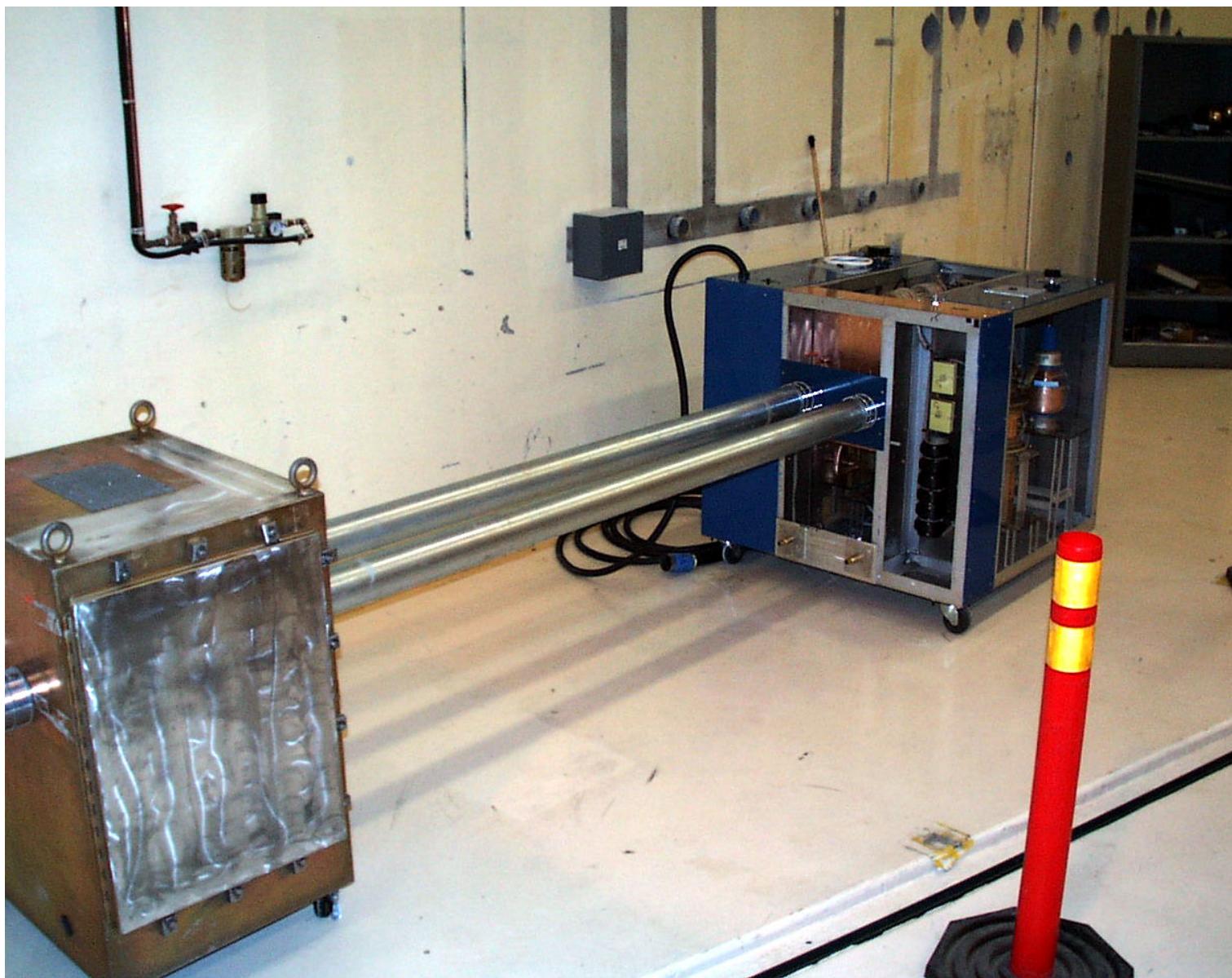


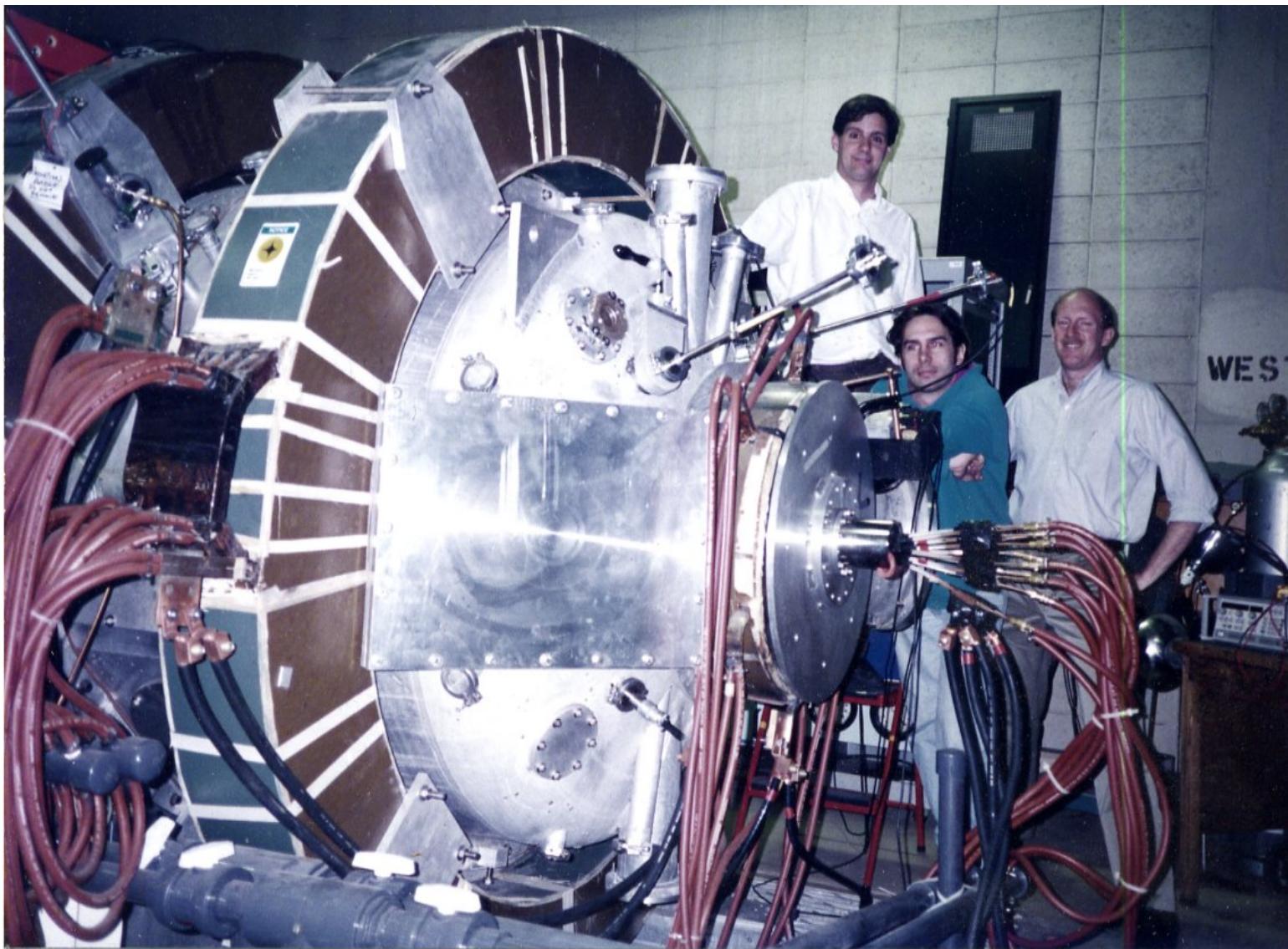


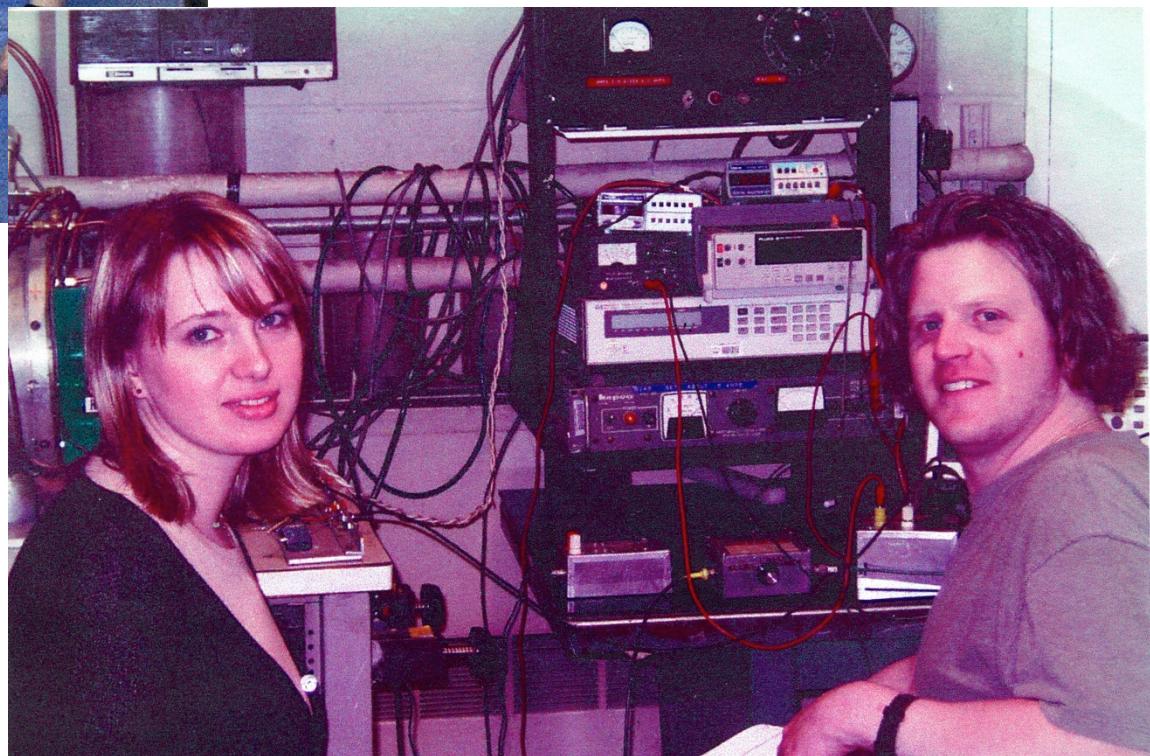
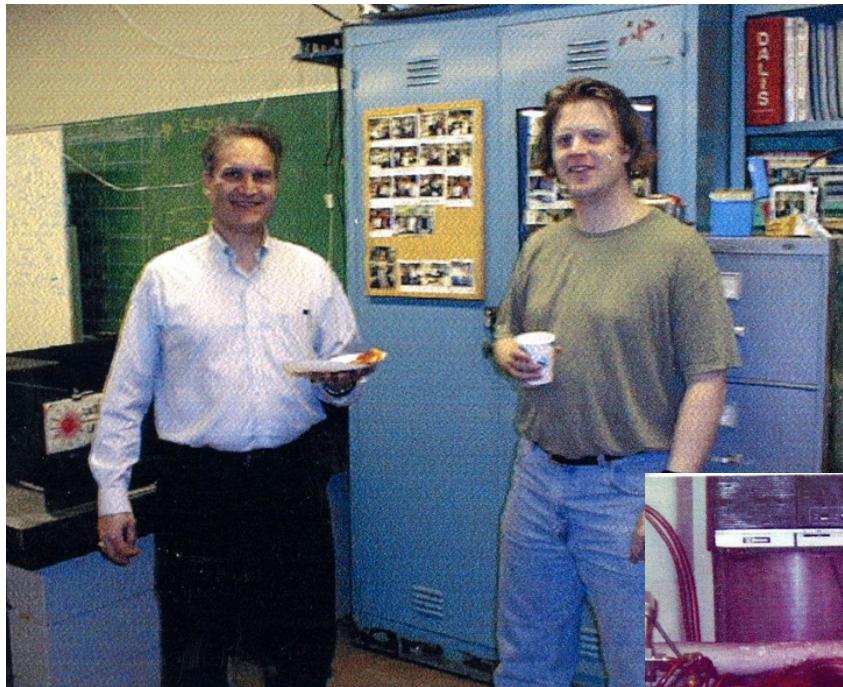
HBT RF Assembly



HBT RF Assembly







2000-
2001





2004

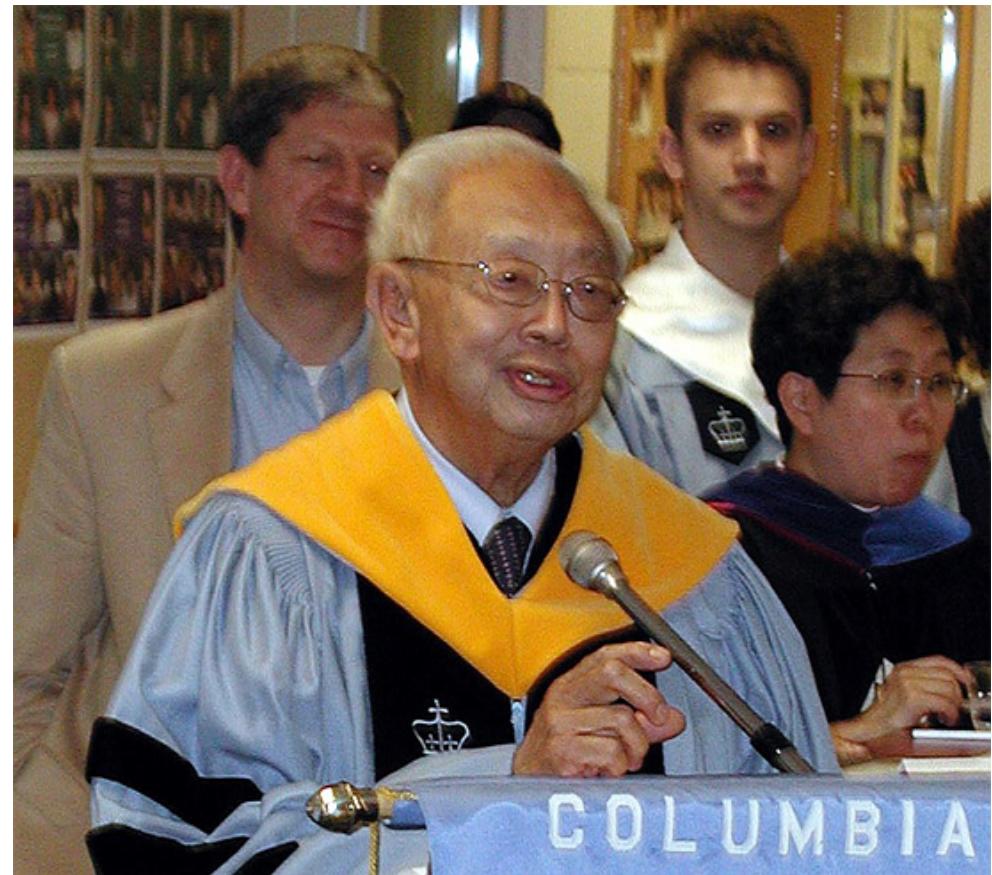


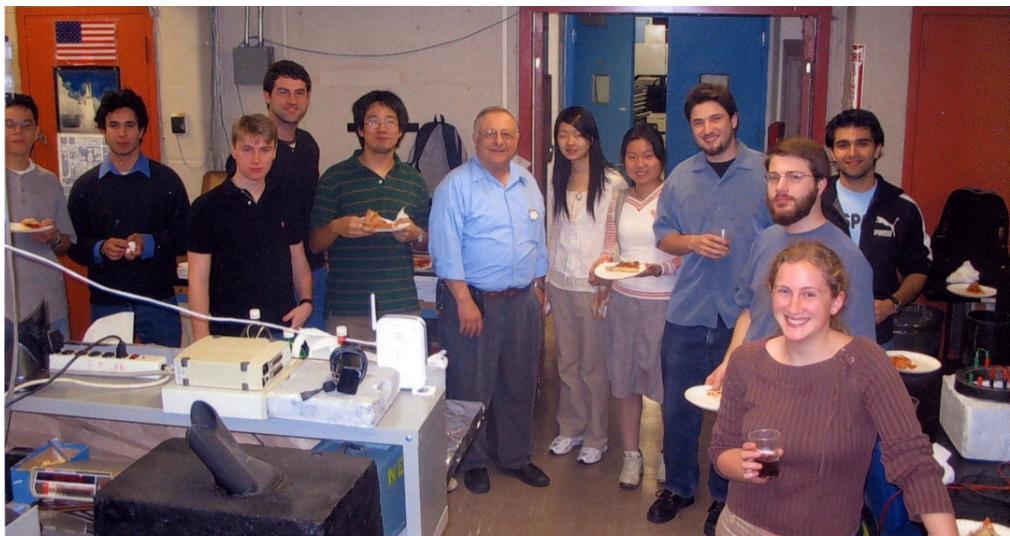
2005





2005

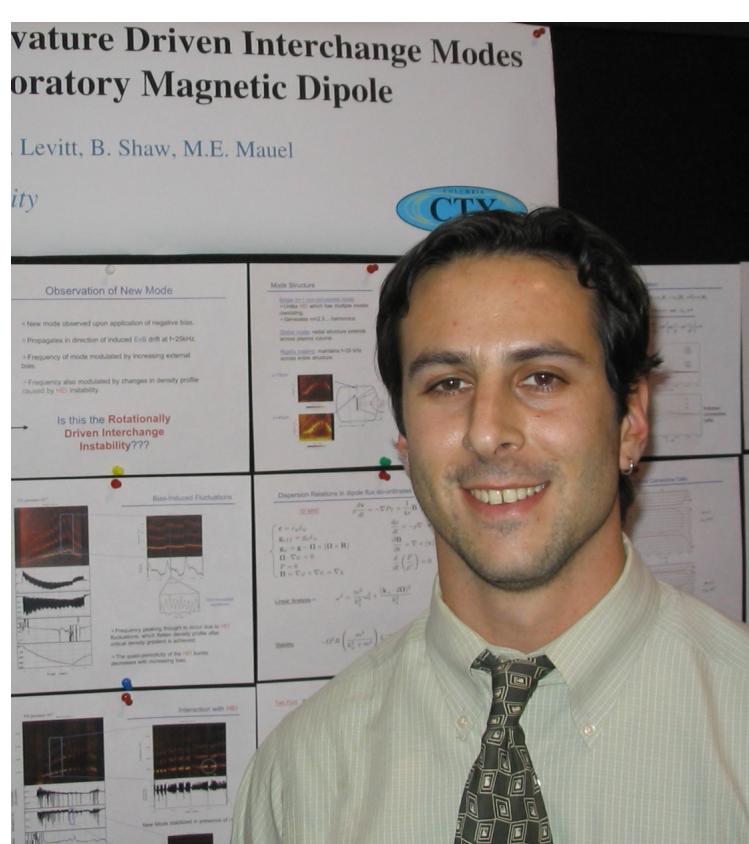




vature Driven Interchange Modes oratory Magnetic Dipole

Levitt, B. Shaw, M.E. Mauel

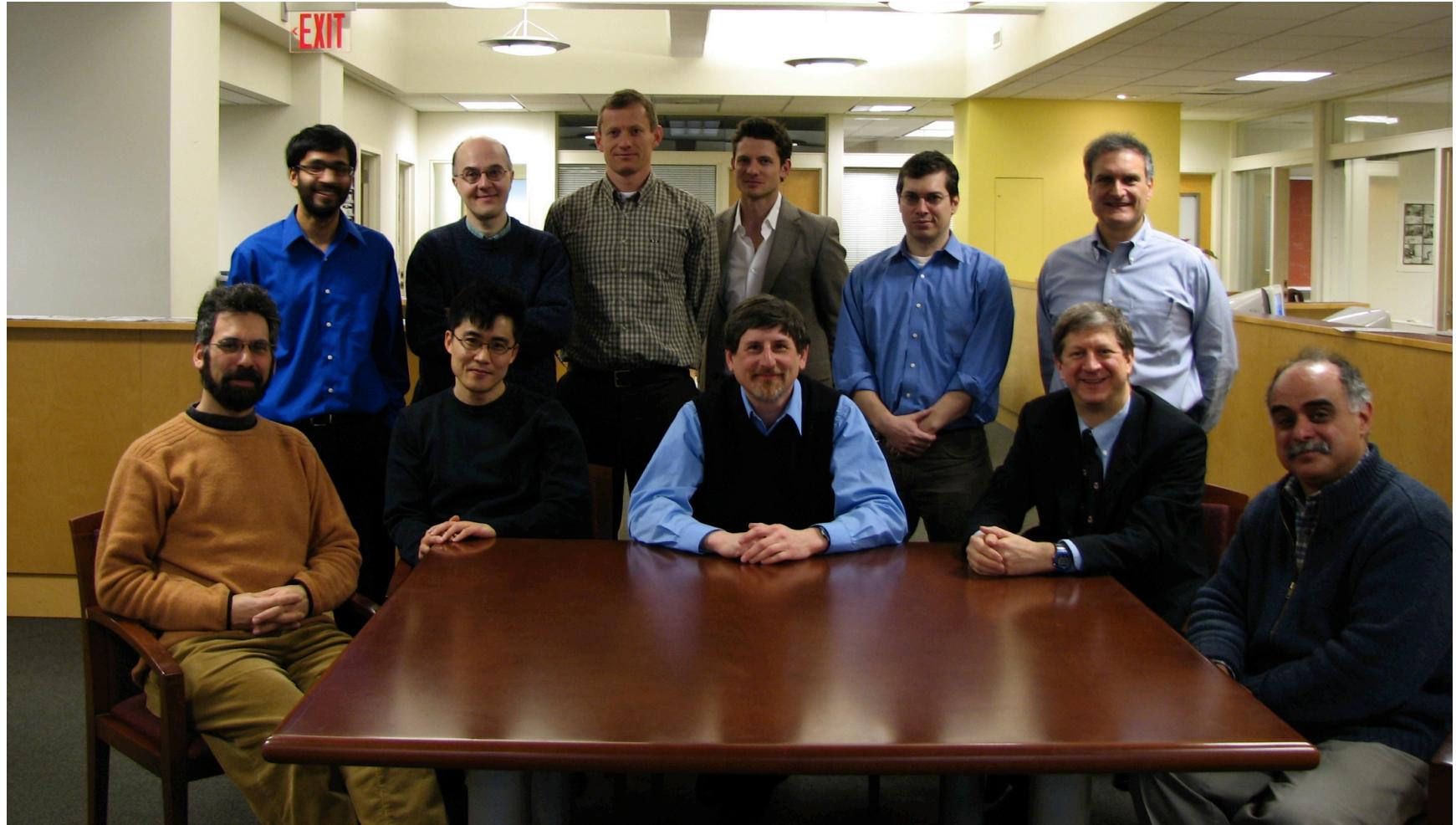
ity



2006



2007



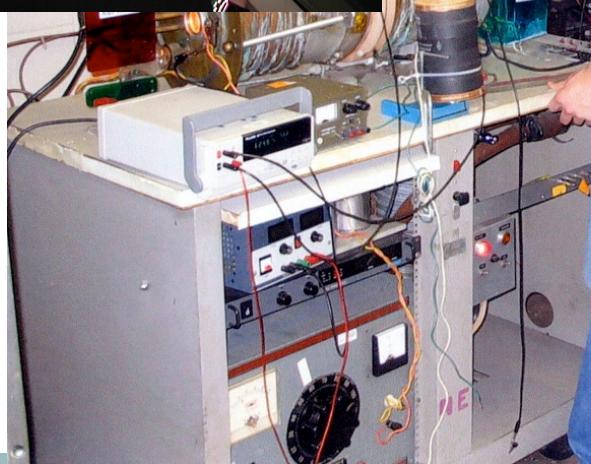
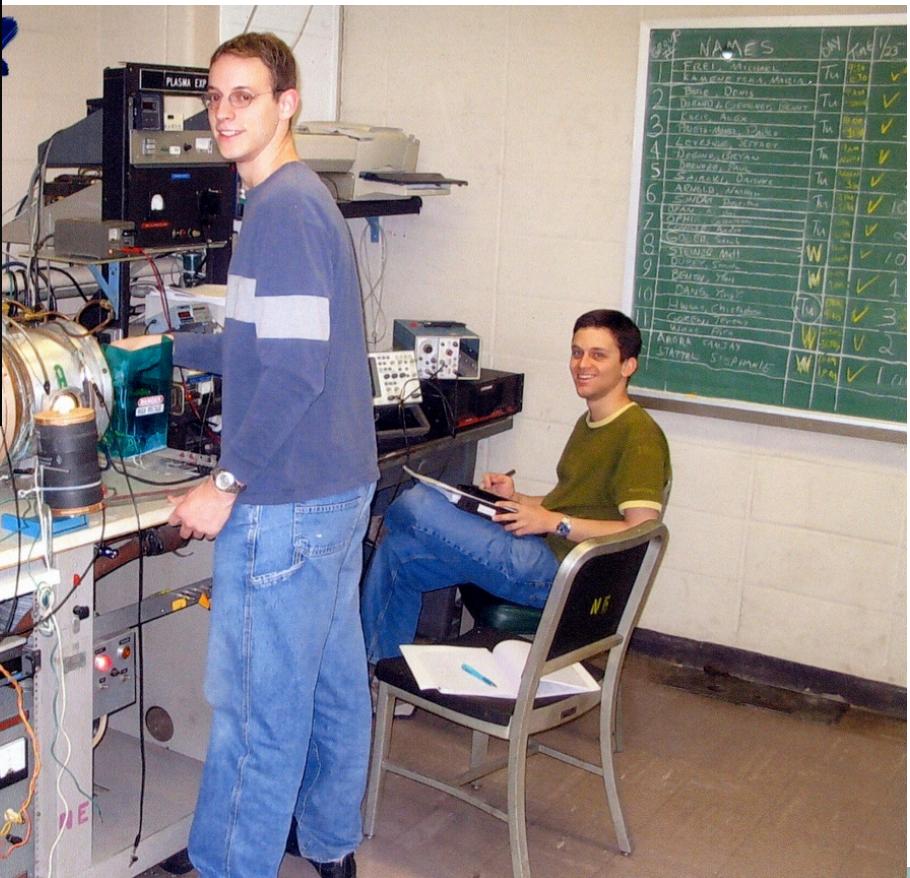
2007



2008











2009



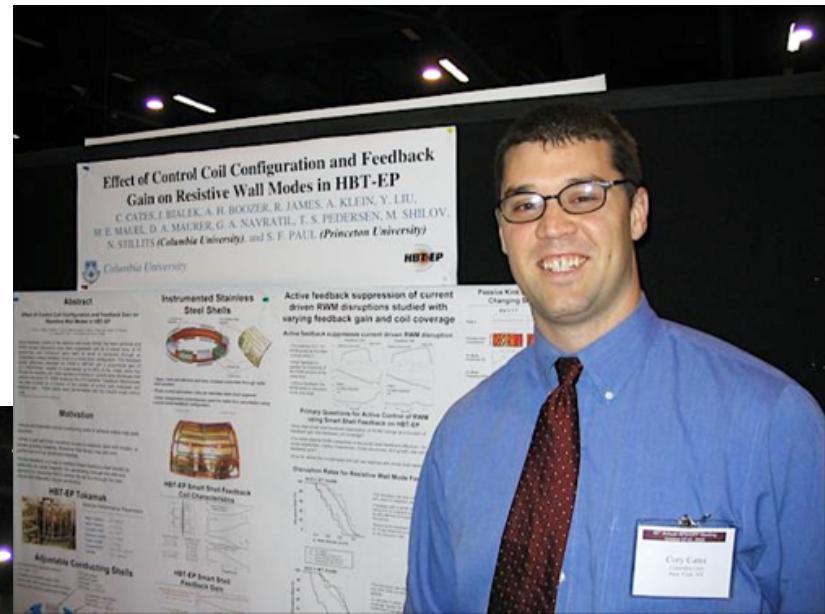


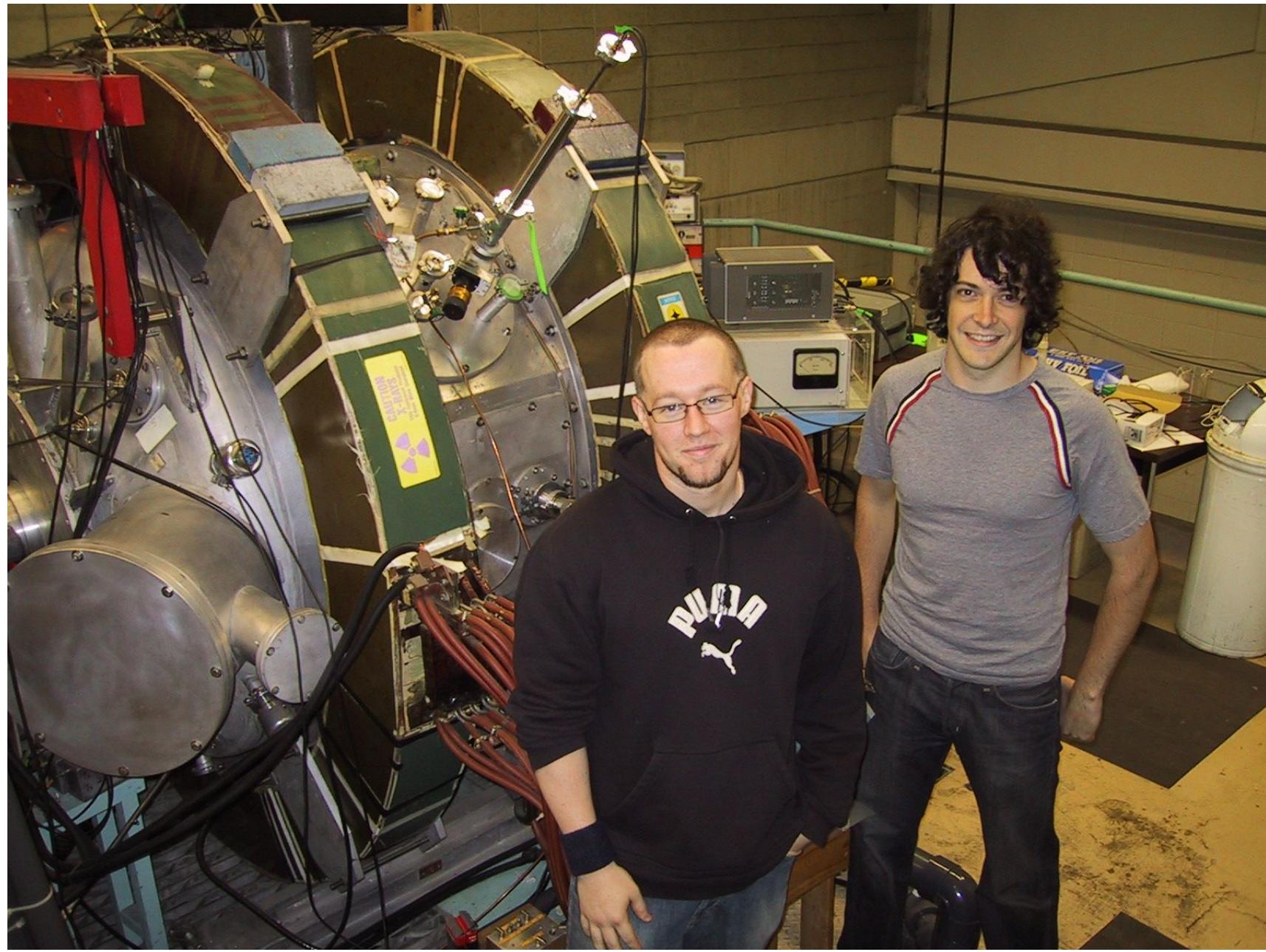
2009

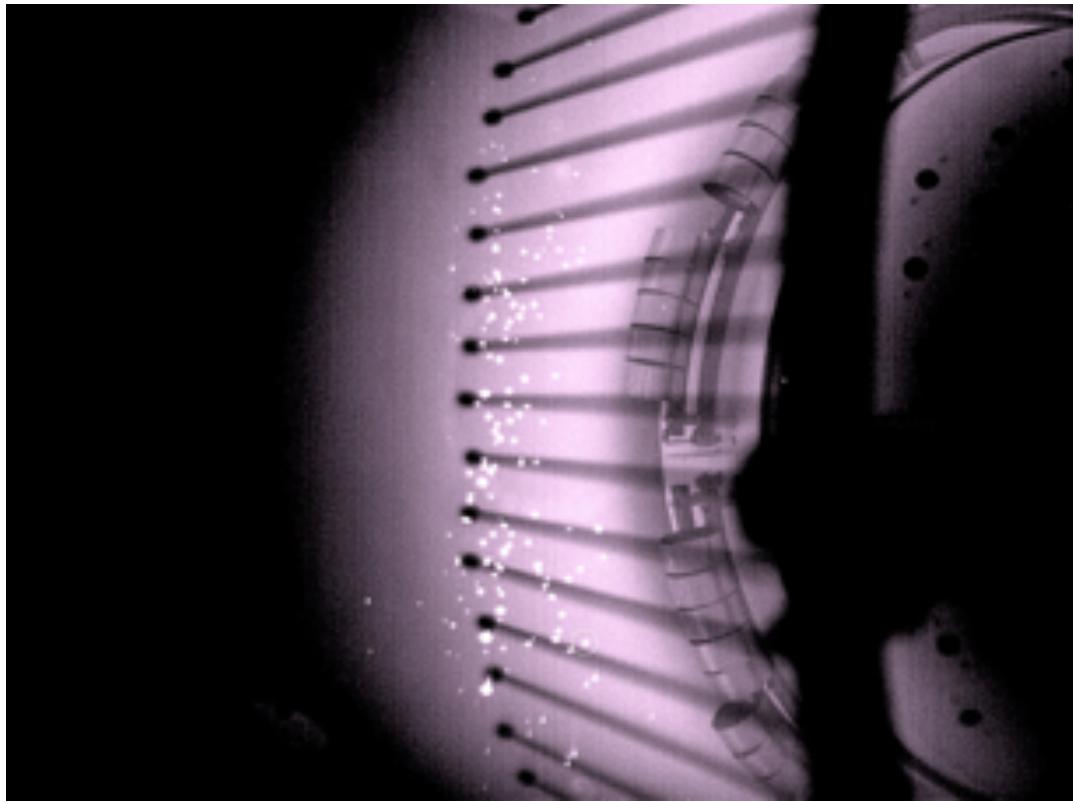








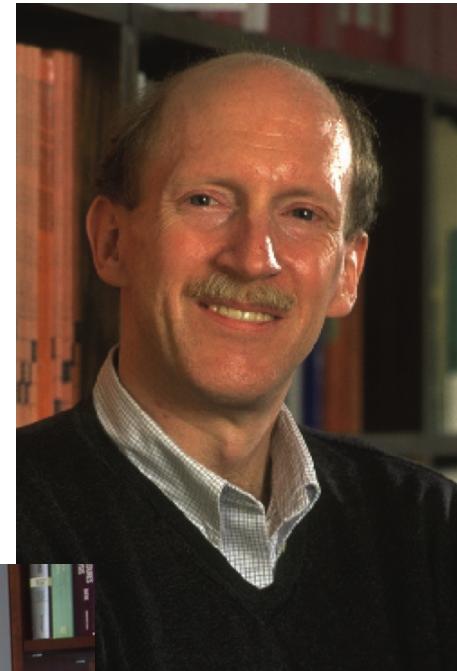




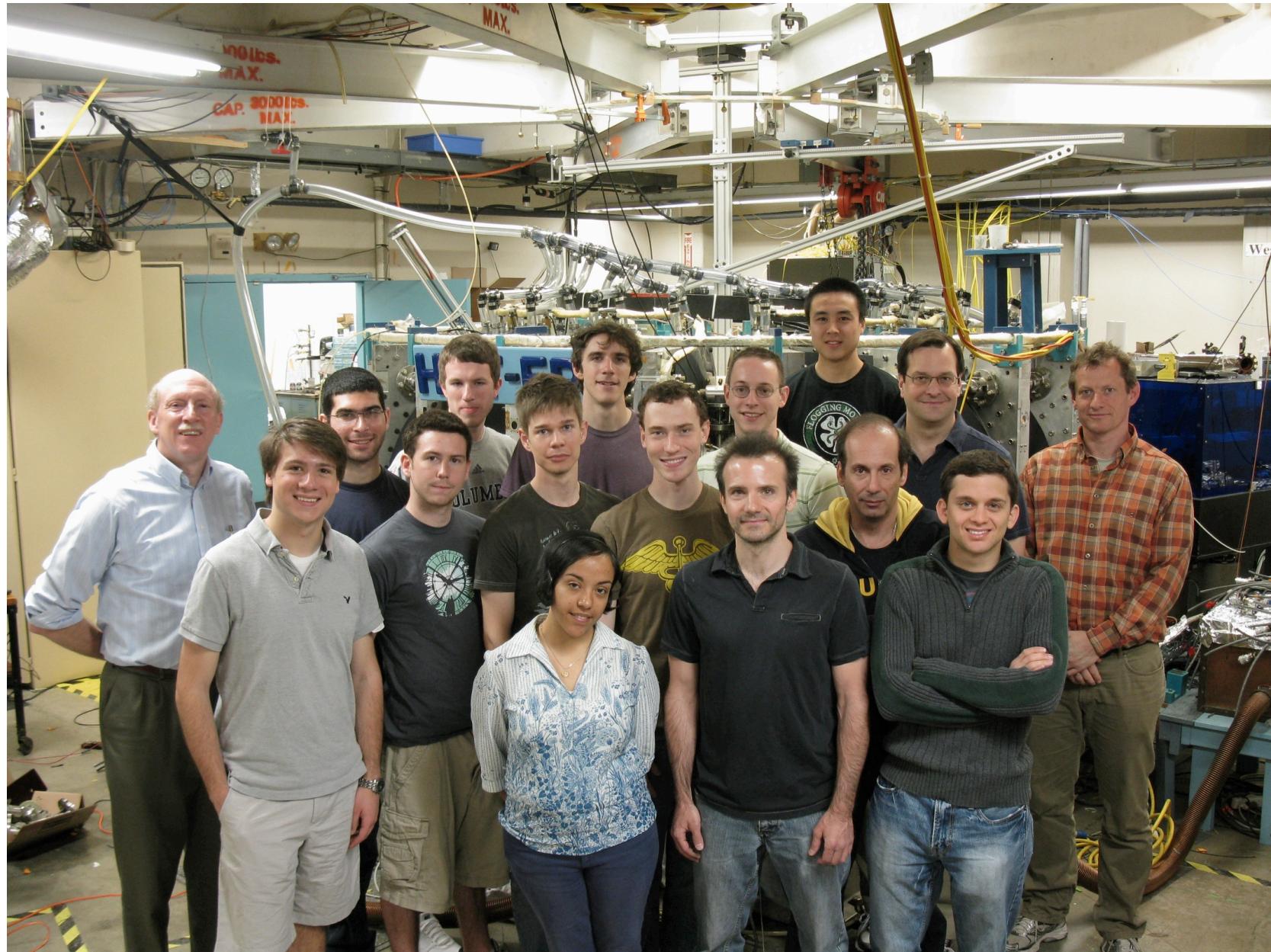












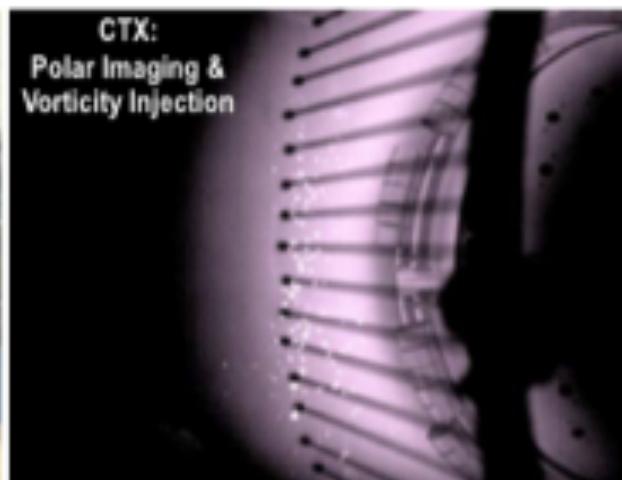
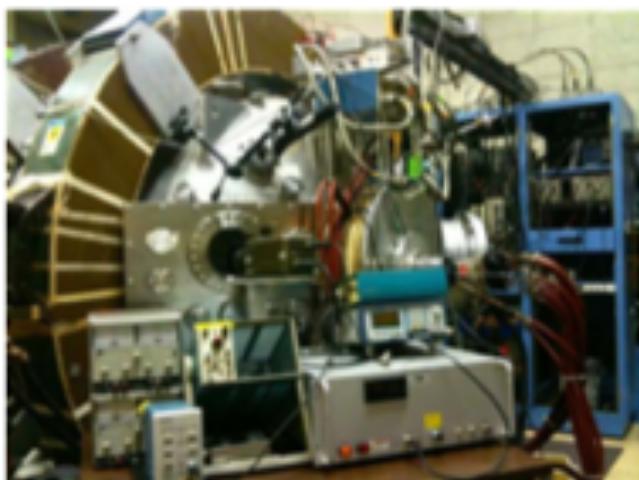
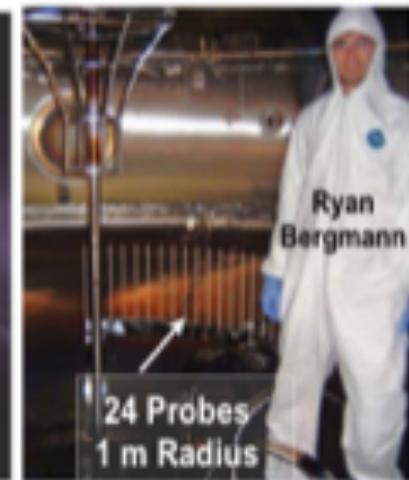




2009

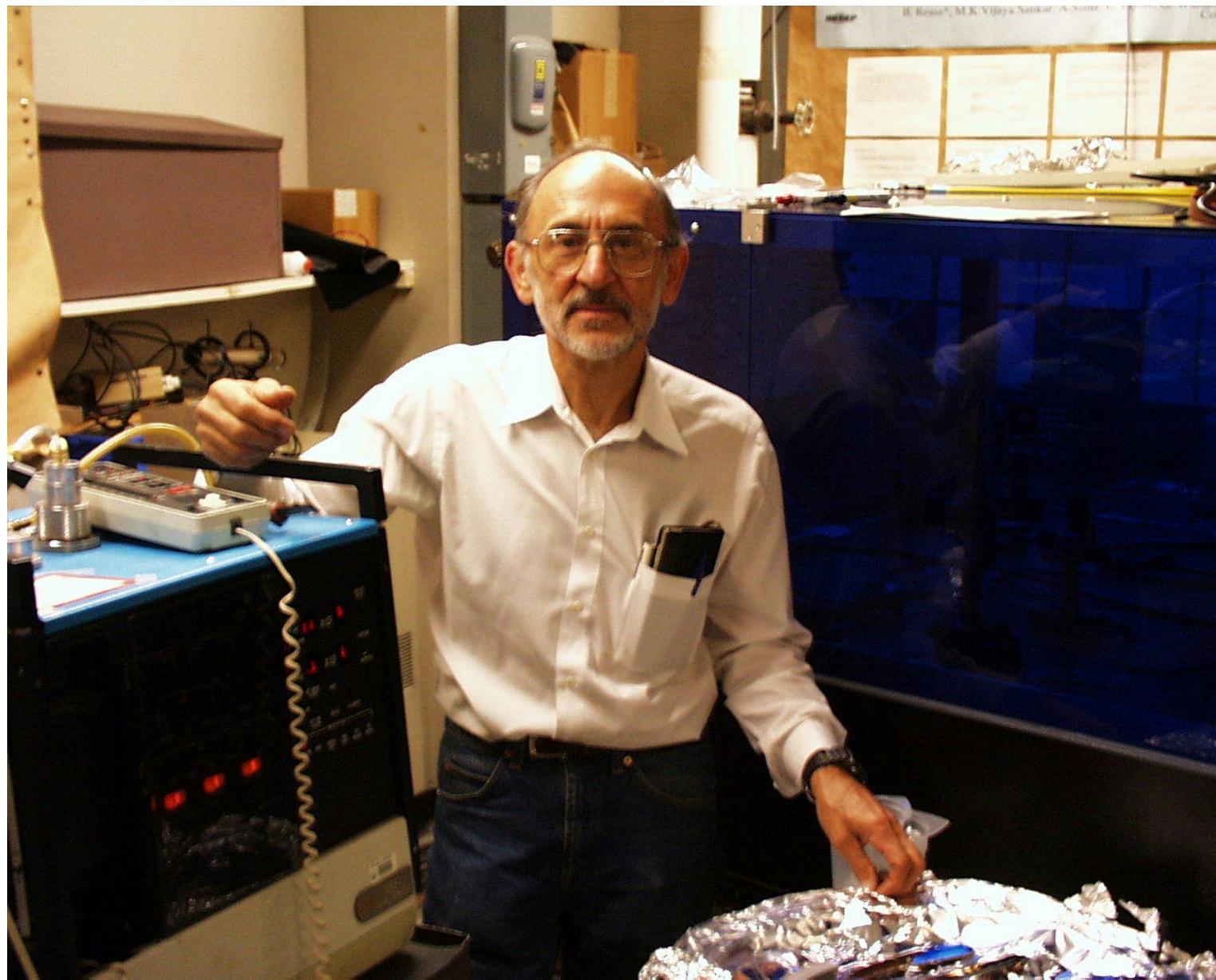


2011 NSF/DOE Fund Laboratory Magnetosphere Collaboration











412

AUDITORIUM

C. PRESCOTT DAVIS ALUMNI AUDITORIUM

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ALUMNI ASSOCIATION





































Plasma Physics Lab 50th Anniversary

Thursday, April 26, 2012



A man in a dark suit and glasses stands behind a podium, speaking into a microphone. He has a name tag on his left chest. The podium is light-colored wood with a dark top. A small computer monitor sits on the podium.

Plasma Physics Lab 50th Anniversary

Thursday, April 26, 2012







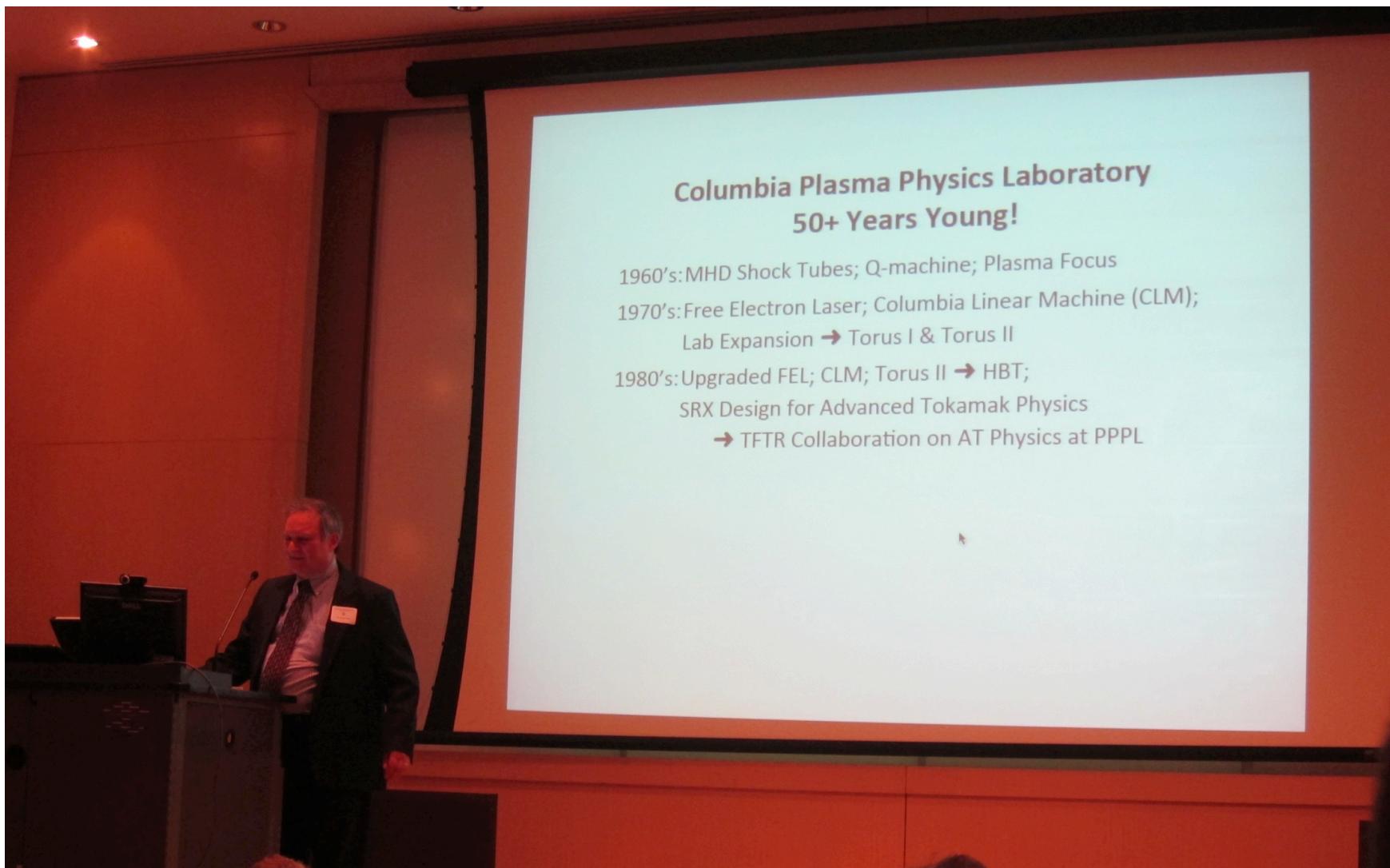
Columbia Plasma Physics Laboratory 50+ Years Young!

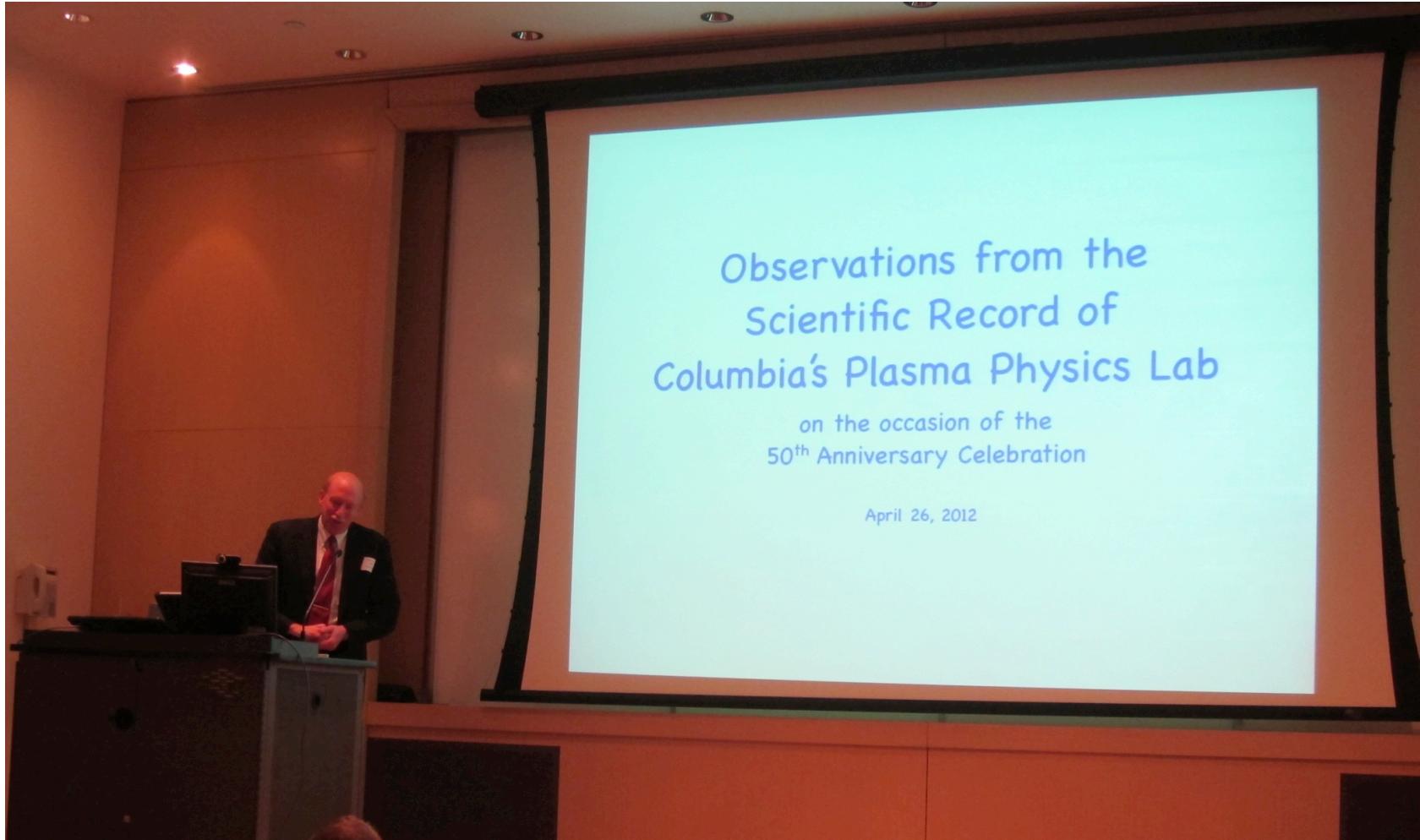
1960's: MHD Shock Tubes; Q-machine; Plasma Focus

1970's: Free Electron Laser; Columbia Linear Machine (CLM);
Lab Expansion → Torus I & Torus II

1980's: Upgraded FEL; CLM; Torus II → HBT;
SRX Design for Advanced Tokamak Physics

→ TFTR Collaboration on AT Physics at PPPL





Observations from the
Scientific Record of
Columbia's Plasma Physics Lab

on the occasion of the
50th Anniversary Celebration

April 26, 2012







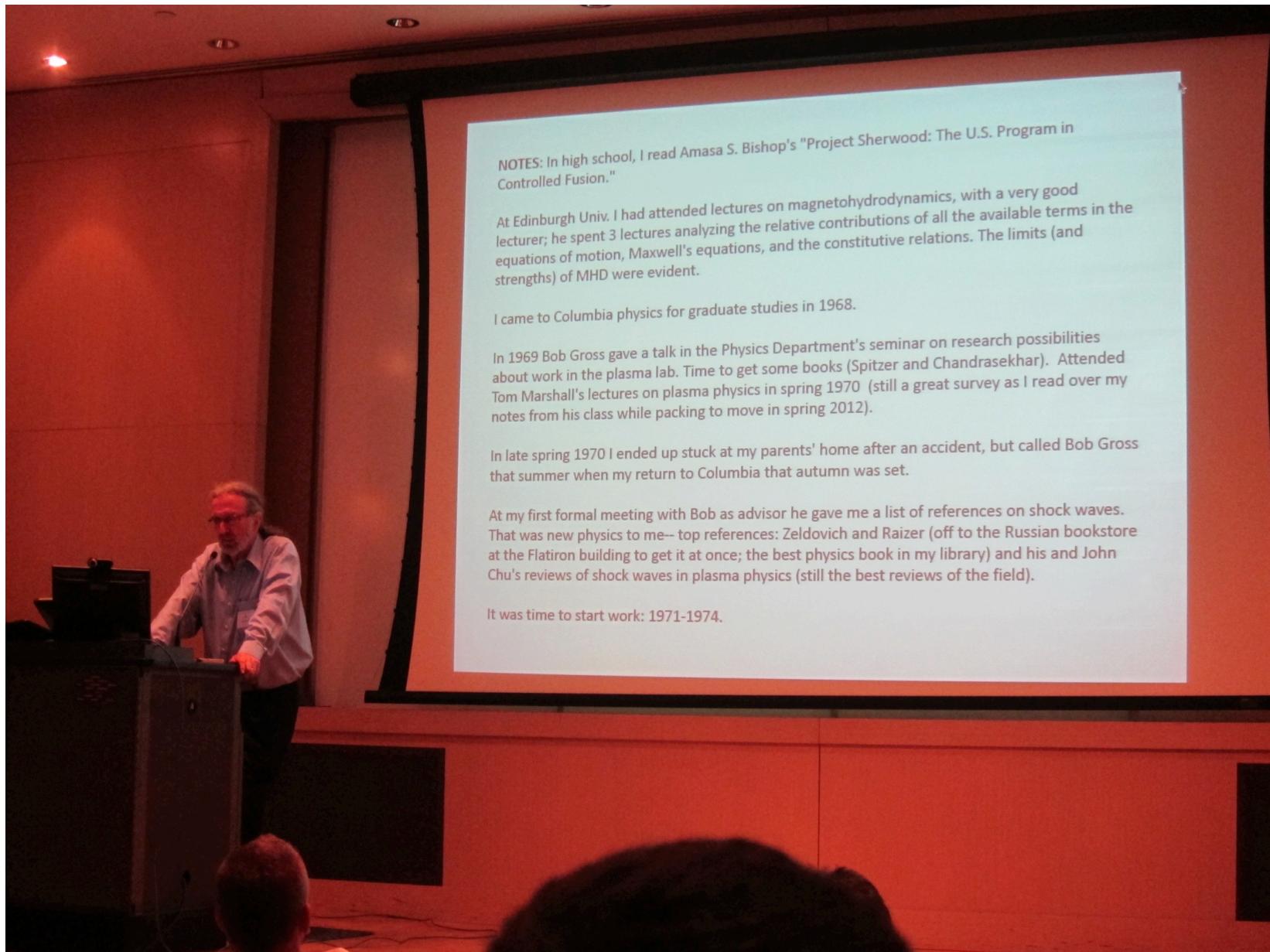












NOTES: In high school, I read Amasa S. Bishop's "Project Sherwood: The U.S. Program in Controlled Fusion."

At Edinburgh Univ. I had attended lectures on magnetohydrodynamics, with a very good lecturer; he spent 3 lectures analyzing the relative contributions of all the available terms in the equations of motion, Maxwell's equations, and the constitutive relations. The limits (and strengths) of MHD were evident.

I came to Columbia physics for graduate studies in 1968.

In 1969 Bob Gross gave a talk in the Physics Department's seminar on research possibilities about work in the plasma lab. Time to get some books (Spitzer and Chandrasekhar). Attended Tom Marshall's lectures on plasma physics in spring 1970 (still a great survey as I read over my notes from his class while packing to move in spring 2012).

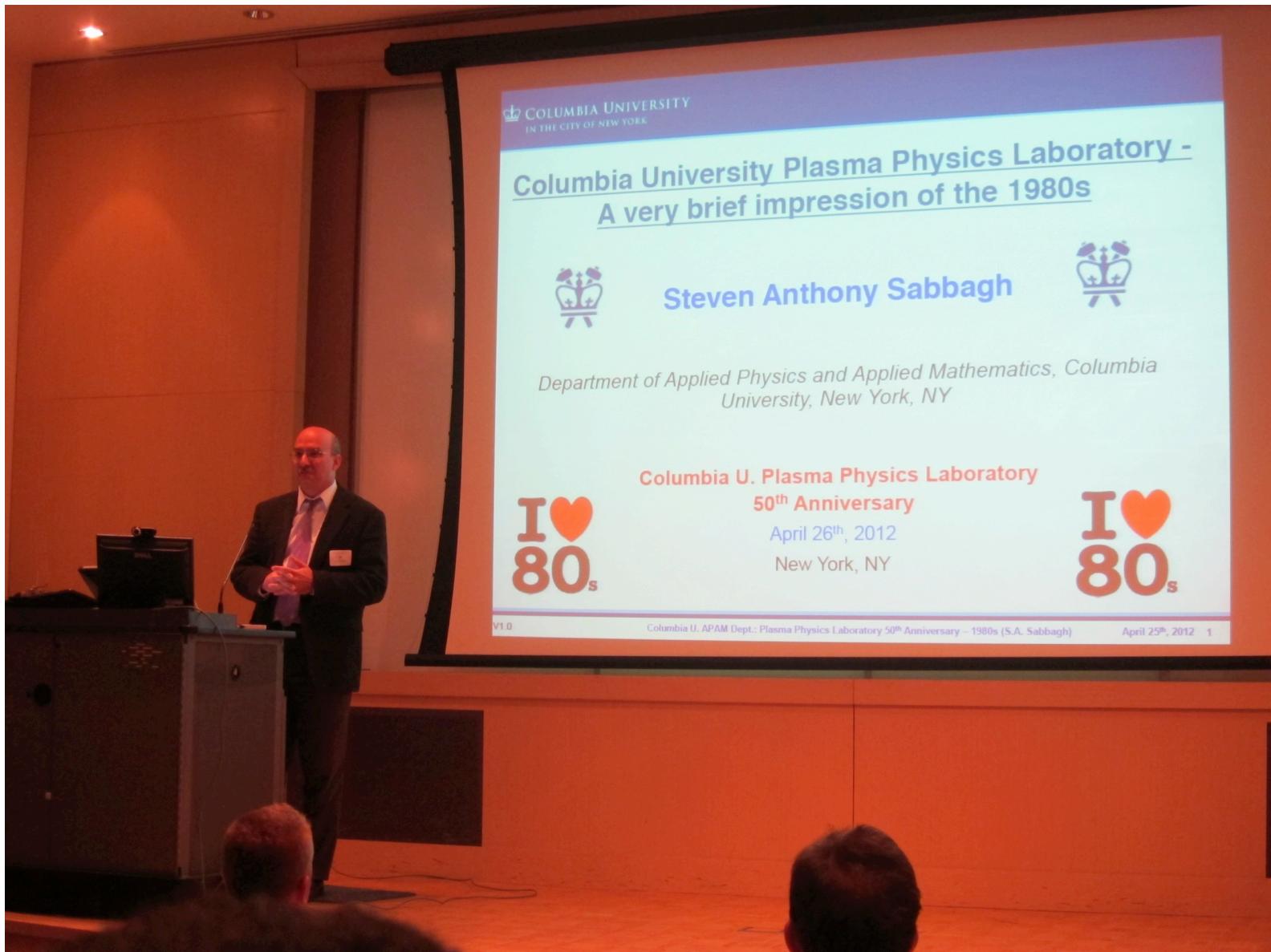
In late spring 1970 I ended up stuck at my parents' home after an accident, but called Bob Gross that summer when my return to Columbia that autumn was set.

At my first formal meeting with Bob as advisor he gave me a list of references on shock waves. That was new physics to me-- top references: Zeldovich and Raizer (off to the Russian bookstore at the Flatiron building to get it at once; the best physics book in my library) and his and John Chu's reviews of shock waves in plasma physics (still the best reviews of the field).

It was time to start work: 1971-1974.







COLUMBIA UNIVERSITY
IN THE CITY OF NEW YORK

Columbia University Plasma Physics Laboratory - A very brief impression of the 1980s



Steven Anthony Sabbagh



Department of Applied Physics and Applied Mathematics, Columbia
University, New York, NY

Columbia U. Plasma Physics Laboratory

50th Anniversary

April 26th, 2012

New York, NY



V1.0

Columbia U. APAM Dept.: Plasma Physics Laboratory 50th Anniversary – 1980s (S.A. Sabbagh)

April 25th, 2012 1



August 1980 - pre-Columbia Plasma Lab days
(T-minus ~3.5 years...)

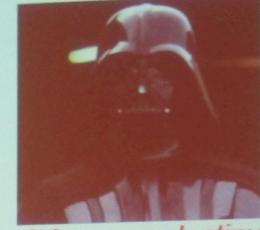
(yes, that dates me – now associated with Columbia 32 years ...)

□ **1980**

- ❑ Dean Vreeland at freshman orientation states 50% departure rate in 1st year
 - He didn't give statistics on # of people remaining 32 years or more. Puzzling...
- ❑ Prof. Chu gives lecture at orientation, which basically sets my destiny....
- ❑ Pac-Man video game invented; took 19 years for first person to ever finish it fully!
 - Finished level 255, at level 256, half the screen became jumbled (ahh - 8 bits!)
 - Solace that it took 10 less years to get Ph.D.

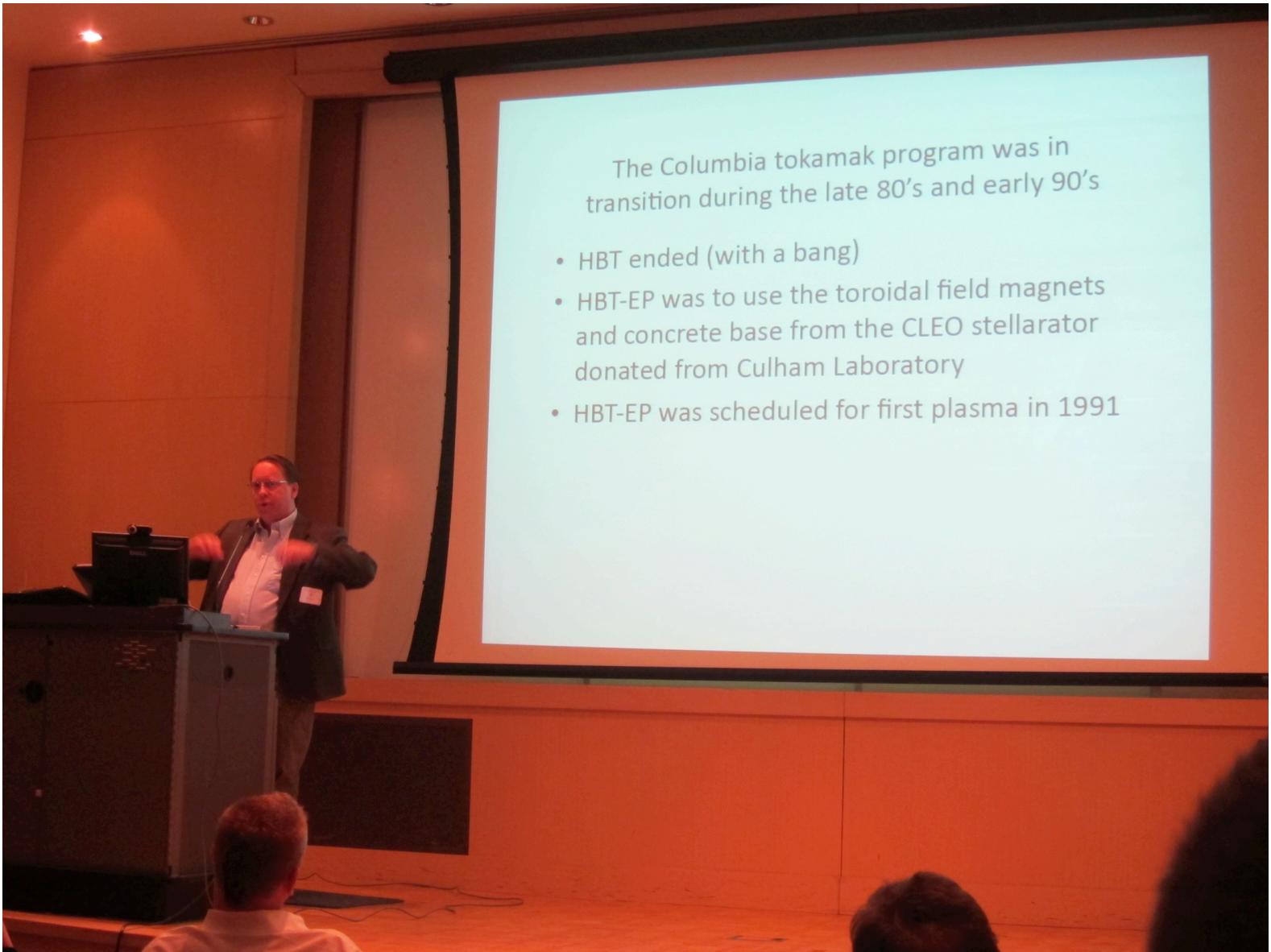
□ **1984**

- ❑ The Macintosh propels us into the future, graduation propels me into the plasma lab
 - Developer's names were inscribed inside Mac

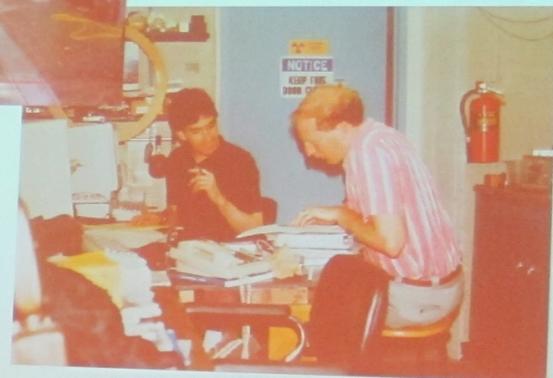


...it is...your destiny!

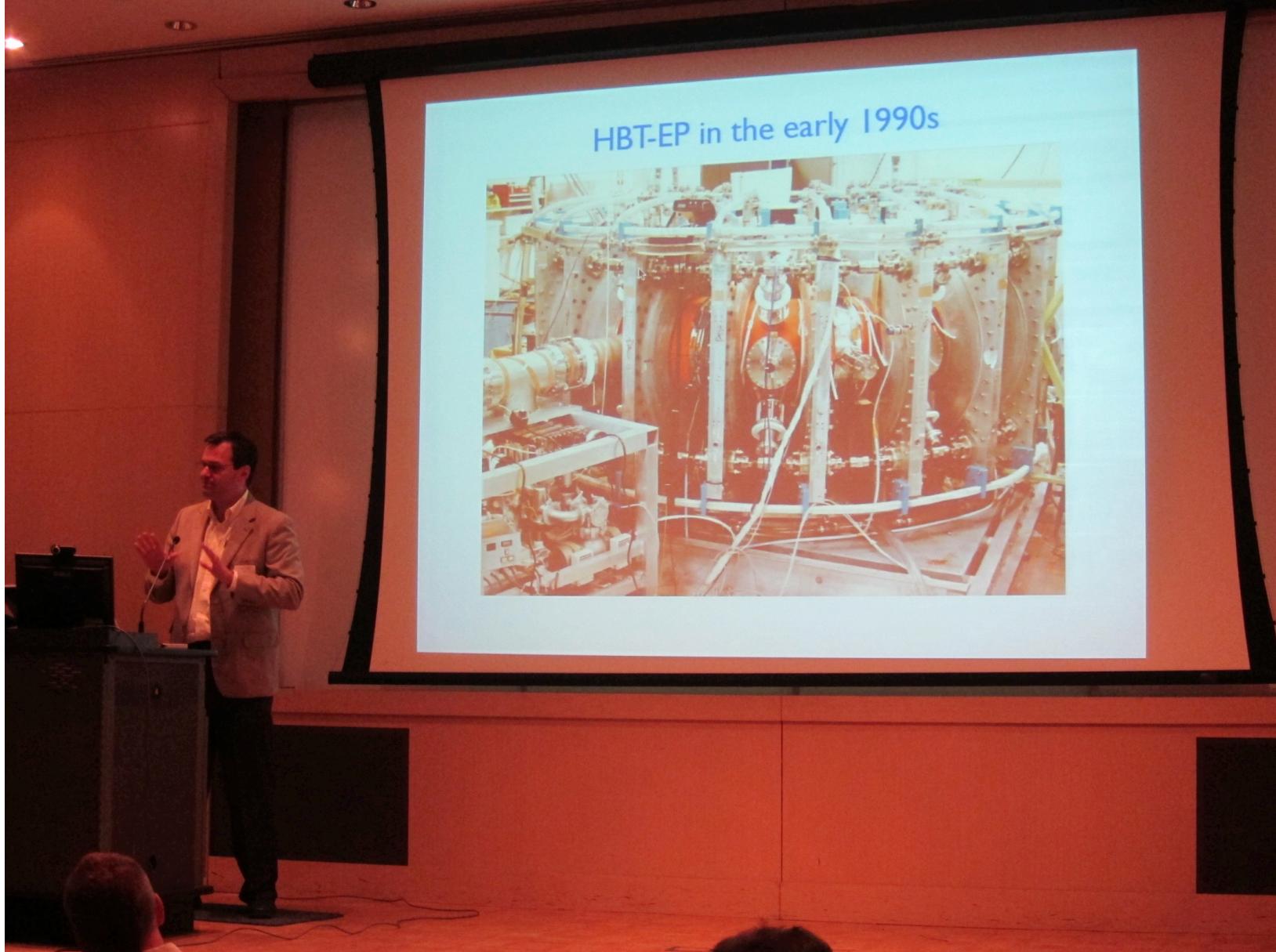
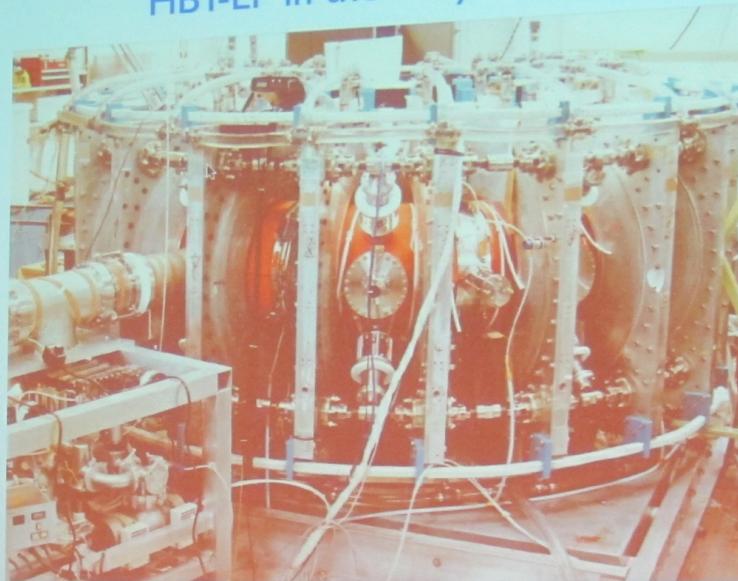




Demolition and design (circa 1989)



HBT-EP in the early 1990s



My Years at Columbia University Plasma Physics Group 2000 – 2007

by Oksana N. Katsuro

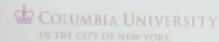
Plasma Physics Lab
50th Anniversary Celebration

Columbia University
04/26/2012

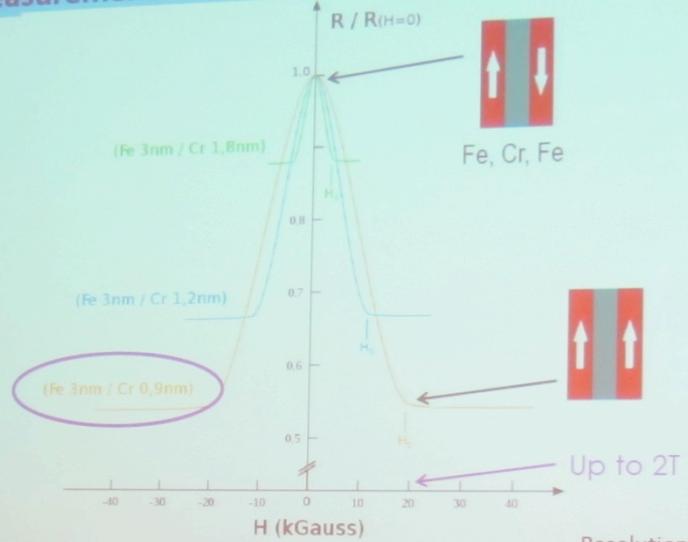


Fantasia ed Entusiasmo

Francesco Volpe
April 26, 2012



Giant Magneto-Resistance will convert Magnetic Field Measurements in Resistance Measurements



COLUMBIA UNIVERSITY
IN THE CITY OF NEW YORK































