



Attn: Grads

Graduate students will have an opportunity to express their opinions on a variety of academic and housing issues on a questionnaire they will receive at Registration Monday, Feb. 3. The survey forms will be distributed with ID validation stickers to all graduate students and a table will be provided for students to fill out the forms.

The survey is being conducted by the Academic Policy and Planning Committee of the Graduate Student Council in conjunction with several Institute Offices. Its results will be considered in future policy decisions regarding graduate student life at MIT.

Arts grants

The third deadline for grant proposals to the Council for the Arts is Friday, January 31. Any individual or organization formally associated with MIT is eligible to apply for Council funds for arts-related projects. All artistic disciplines are welcome and previous experience in the arts is not a requirement for funding.

For more information, and for application forms and program guidelines, call Alison Shafer, x3-4003, or stop by the Council Office at E15-205.

Harassed?

A film, "You are the Game: Sexual Harassment on Campus," will open a forum on harassment Thursday, Jan. 30, at 3pm in Huntington Hall (Rm 10-250). A panel and open discussion will follow. The community is invited.

Topics to be considered include harassment as a form of discrimination, legal aspects of harassment and peer harassment. The forum is being sponsored jointly by the Offices of the Dean for Student Affairs and the Graduate School, the Cheney Room and the Department of Applied Biological Sciences.

Altman on Ch. 2

A half-hour television interview of John Updike by China Altman of the MIT News Office will be aired as an introduction to the American Playhouse presentation of Updike's "The Roommate," to be broadcast by PBS on January 27 from 9-11 pm. It will be seen locally on Channel 2. The dramatization is based on an Updike short story about two mismatched college roommates. Ms. Altman's interview with Updike was filmed as part of a series of interviews she did several years ago for WGBH-TV.

Calder show

Ever wonder what was in Alexander Calder's mind when he created *The Big Sail* in McDermott Court? Keys to understanding the legendary artist's work will be provided in a new exhibition: "Alexander Calder: Artist as Engineer," opening next week (January 31) in the Bakalar Sculpture Gallery of the List Visual Arts Center in the Wiesner Building. This will be the third of a continuing series designed by MIT's Committee on the Visual Arts as a survey and introduction to the great sculptors of this century. Calder came to MIT himself to install *The Big Sail*, known as a stabile, with the aid of a crew of union steel workers, 21 years ago.

LIS reminder

Friday, Jan. 24, is the deadline for registering for spring term classes at the Lowell Institute School. See page 10 for course offerings.

Real-time Voyager images expected this week



MIT's Voyager Plasma Science Team, headed by Professor Herbert S. Bridge of the Department of Physics and the Center for Space Research, is seeking the "inside story" on Uranus. Instruments aboard Voyager 2, which makes its closest approach to the planet on January 24, are expected to relay information on Uranus' interior and other features. The satellite was launched in 1977. Team members are: seated, John D. Richardson, post-doctoral fellow, CSR, left, and Professor Ralph L. McNutt Jr; standing, center, Fran Bagenal, visiting scientist, Imperial College, London; back row, from left, graduate students Richard S. Selesnick and Mark R. Sands, research scientists George S. Gordon Jr. and James D. Sullivan, and Professor John W. Belcher and Dr. Bridge. All but one of the team is now at the Jet Propulsion Laboratory in Pasadena, Calif., the main link to the satellite. Mr. Selesnick remains at MIT to coordinate IAP Voyager activities and to be the team's on-campus link.

—Photo by Calvin Campbell

MIT scientists hope to find clues to Uranus' interior, when Voyager 2 visits the far distant planet this week and sends back images to earth that can be seen at MIT almost as they arrive.

The satellite will make its closest approach past the planet on January 24 at 1pm (EST). It has been traveling outward through space since it was launched in 1977, and has already visited and relayed information on Jupiter and Saturn.

Real-time images direct from Voyager 2 will be shown in Edgerton Hall, Rm 34-101, Thursday and Friday, Jan. 23 and 24, 12noon to 4pm. Radio signals, which will take 2 hours and 45 minutes to reach earth, will be received at the Jet Propulsion Laboratory in Pasadena and relayed by telephone to MIT. A different, unedited image will slowly appear on the 10-foot screen every five minutes. Video, film, and oral presentations will be made as the images are projected.

"We expect this program to be very interesting," said Gladys Barron of Educational Video Productions, which has been coordinating the intricate technical procedure for providing the imaging. "There has been a lot of interest in it. I think it is because of the immediacy."

If the lecture hall overflows, the imaging will be shown on the MIT Cable. "But it is best to see it in Edgerton because of the large screen and the explanations that will go with it," Mrs. Barron said.

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Private ownership of highways proposed at transportation forum

By ROBERT C. DI IORIO
Staff Writer

An MIT engineer says the federal and state governments might save billions in road maintenance costs if some of America's highways were sold into private ownership.

"If this idea only improves the efficiency of highway maintenance by 5 or 10 per cent, which seems to me quite possible, it will save us scores of billions of dollars," said Dr. Fred Moavenzadeh, William E. Leonhard Professor of Engineering in the Department of Civil Engineering.

He made his proposal Saturday, Jan. 18, at a forum on the future of transportation

organized by the Center for Transportation Studies. The forum, at the Silverado in Napa Valley, Calif., brought together leading executives from major private and public organizations involved in transportation—including carriers, shippers, investors and government. The purpose of the forum—the second MIT has organized—was to examine how economic and technological trends will affect the development of our transportation system.

Professor Moavenzadeh said the nation's highway system—more than three million miles of roads and highways—"is in danger

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Artery substitute aids research

By LAUREN SEELEY

Quick in the wake of substitute hearts and substitute skin comes the advent of substitute arteries.

A team of MIT biologists has reported the development of techniques to fabricate substitute arteries almost entirely from living animal cells and the proteins that normally surround such cells.

Dr. Crispin B. Weinberg, a research fellow, and Professor Eugene Bell, both in the Department of Biology, report in the current issue of *Science* magazine that they have fabricated arteries in the laboratory that are essentially equivalent to mammalian arteries.

The multi-layered living substitute, termed an "artery equivalent" by Dr. Weinberg and Dr. Bell, performs in laboratory tests like a normal mammalian artery and, therefore, will be especially useful in studying the causes and potential cures of cardiovascular diseases, Dr. Bell said.

Although the artery equivalent may ultimately serve as a substitute artery in humans, Dr. Bell stressed that its immediate use will be in trying to find out more about cardiovascular diseases.

"The isolated artery equivalent will provide a tremendous advantage as a model system,"

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Weatherall: Job market is mixed

By SHARON DAVIS
Staff Writer

"The job climate for MIT graduates this year is a bit up and down," reports Robert K. Weatherall, director of Career Services and Preprofessional Advising.

"There are uncertainties in the computer, semiconductor, oil and chemical industries. Some of the major corporations, including IBM, will not come to MIT this spring. But lots will come," he promised.

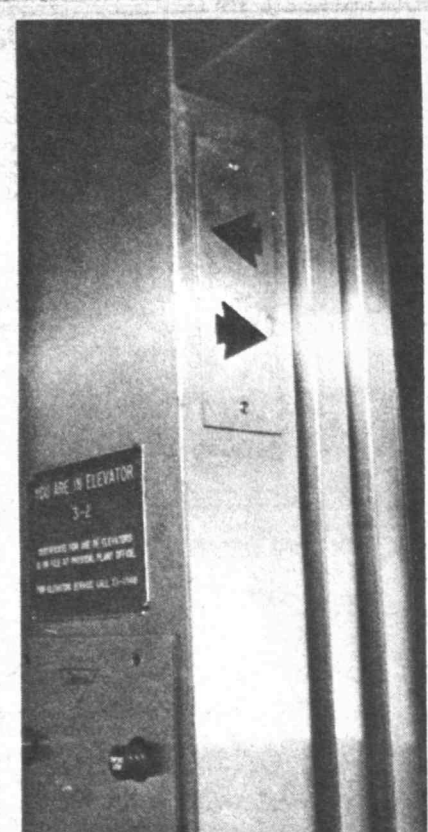
More companies recruit here than at most colleges. "They think of us as a prime source for science and technology. But too many students believe these are the only companies

they should apply to. There are many others," he said.

Twenty-six offices, plus a conference room, are used by companies to interview prospective employees in the career center. More than 400 recruiters come to the Institute each year. Phyllis Jackson is coordinator of recruiting.

But, for some majors such as architecture and urban studies and planning, the recruiting process is not the main route to a job. "Architectural and planning firms are small and seldom recruit. They rely on students to go after them. We tell students that jobs are there and to cast their net wide," said Elizabeth

(continued on page 11)



An elevator for lateral moves was created in Building 3 recently when a horizontal indicator plate was installed in place of a vertical one. Does this make the machine a lativator?

—Photo by Calvin Campbell

Watch the windows

Sometime within the next few days, if all goes according to schedule, the windows of Lobby 7 will glow with color.

The art project is the work of four students in architecture: graduate student Arjun Mangaldas, senior Ian Whitelaw and sophomores Karen Nelson and Fang-Pin Lee. Last spring they mounted squares of primary colors above the doors to test their effect on the Lobby. Now they are ready to put up their design, which will be on view through the first week in February, and could be remounted sometime in the future.

The present installation is scheduled to take advantage of the day late this month when rays of the setting sun extend the length of the main corridor.

MIT to take part in storm study

By CHARLES H. BALL
Staff Writer

Three MIT scientists are participating in a \$10 million study to learn more about the severe winter storms that form along and off the east coast of the United States, often leading to crippling snowfalls in the megalopolis stretching from Washington to Boston.

The study—said to be the largest operation of its kind ever undertaken—will try to determine more precisely what causes the storms and how to predict them better. The project will employ the resources of 17 universities, seven federal agencies, six satellites, eight aircraft, two ships and scores of ground stations and research buoys.

The MIT participants, all in the Department of Earth, Atmospheric and Planetary Sciences, are Kerry A. Emanuel, associate professor of meteorology; Randall M. Dole, assistant professor of meteorology; and Earle R. Williams, assistant professor of meteorology.

They will conduct research on the dynamics and electrical characteristics of the storms, which in New England are called northeasters because the flow around the oceanic storms produces northeasterly winds.

The storms possess several traits that distinguish them from milder continental low pressure systems. They tend to intensify much more rapidly than normal; they develop hurricane-like features including so-called "eyes"; and they occasionally contain very powerful cloud-to-ground lightning.

The three MIT researchers will test several scientific hypotheses pertaining to these

phenomena in studies carried out both at MIT and at experimental sites.

One hypothesis holds that the rapid intensification of the coastal cyclones is a consequence of unusually strong atmospheric temperature contrasts that sometimes exist near the northern edge of the Gulf Stream. Because temperature contrasts drive most ordinary low pressure systems, extreme contrasts could well be a factor in rapid storm development.

Another possibility to be explored by the MIT scientists is that storm-induced winds draw a substantial amount of heat energy from the sea and, in this respect, cause the storms to behave more like hurricanes.

The three meteorologists also will investigate the supposition that the unusual lightning discharges sometimes seen in the storms are related to the electrical configuration of a special kind of sloping convection that mainly occurs in winter storms.

A variety of tests will be made this winter, from January 15 to March 15, when it is expected that a half dozen winter storms will cross or be born in the experimental area covered by the study, known as GALE, for Genesis of Atlantic Lows Experiment. The observations will be far more detailed, extensive and closely spaced than those provided by the usual observing system.

The project is being organized at the National Center for Atmospheric Research in Boulder, Colo., by a steering committee headed by Dr. Richard Dirks of the National Science Foundation, the lead agency for the study.

Kitz, Mark to co-direct HST

The Harvard-MIT Division of Health Sciences and Technology (HST), the mechanism by which MIT and Harvard link the physical sciences and engineering to medical education, and vice versa, has two new co-directors.

They are Richard J. Kitz, MD, of Harvard Medical School, and Roger G. Mark, MD, PhD, of the MIT Department of Electrical Engineering and Computer Science. Dr. Kitz is the Henry Isaiah Dorr Professor of Research and Teaching in Anaesthetics and Anaesthesia. Dr. Mark is the Matsushita Associate Professor of Electrical Engineering in Medicine.

They succeed Irving M. London, MD, who directed HST since its inception in 1970. Dr. London will continue as professor of medicine at Harvard Medical School and as Grover M. Hermann Professor of Health Sciences and Technology in the MIT Department of Biology.

Dr. Mark has been involved with the research and educational programs at HST for more than 10 years and has directed the Biomedical Engineering Center for Clinical Instrumentation at MIT. Dr. Kitz is a senior member of the Harvard Medical School faculty and is chairman of the Anaesthesia Department at Massachusetts General Hospital. He helped establish the Department of Biomedical Engineering at Massachusetts General and has been a member of HST Joint Faculty Committee for five years.

The co-directors share equally the management responsibility for HST. In addition, each will have as a primary focus one of the two principal HST educational programs.

Dr. Kitz will focus on the Biomedical Sciences Program, which leads to the MD degree with special emphasis on science and technology. The program is guided principally by Harvard faculty and involves MIT faculty in quantitative, biological, physical and engineering segments of course development and independent study, including studies toward a combined MD-PhD in some instances.

Dr. Mark will focus on the Bioengineering and Physical Sciences Program, which leads to the PhD with special emphasis on engineering and the physical sciences as applied to problems in medicine. The program is guided principally by MIT faculty and involves Harvard faculty at affiliated hospitals, in teaching biomedical sciences and in providing clinical experiences for medical physicists and engineers. The program was known formerly as the Program in Medical Engineering and Medical Physics.

Under a new statement of objectives and structure that Harvard and MIT have developed, HST is linked to the Office of the Provost at MIT and the Office of the Dean at Harvard Medical School. Professor Kenneth A. Smith, associate provost and vice president for research, has special responsibility at MIT for the division.

Sylvia Ceyer to hold Class of '43 Chair

Dr. Sylvia T. Ceyer of the Department of Chemistry has been named the first holder of the Class of 1943 Career Development Professorship. Her three-year appointment will continue until October 1, 1988.

The announcement, made by Professor John M. Deutch, Provost and Arthur C. Cope Professor of Chemistry, said the professorship was established to recognize innovative and imaginative teaching by gifted young faculty members who show exceptional

promise of making important contributions to teaching and research throughout their professional careers.

Dr. Ceyer, a member of the faculty since July 1981, was selected for the professorship, in part, because of her "outstanding contributions to both education and scholarship in physical chemistry." The announcement cited her "recent stunning work on chemisorption of carbon monoxide on nickel surfaces."

Dr. Ceyer holds the BA in chemistry (1974) from Hope College, Holland, Mich., and the PhD in chemistry (1979) from the University of California, Berkeley.

She has been active in the affairs of the American Chemical Society. In August 1981

she organized an ACS symposium on "Molecular Processes at Solid Surfaces: Dynamical Aspects." She is presently organizing a symposium on "Molecular Processes at Interfaces: Kinetics and Intermediates in Surface Reactions" to be held next September at the national ACS meeting. She is also a member of the planning committee for the Physical Electronics Conference of the American Physical Society.

Professor Ceyer said that graduate students Sau Lan Tan, Myung Lee, John Beckerle and Qingyun Yang and UROP student Melissa Hines played critical roles in the work on chemisorption of carbon monoxide on nickel surfaces.

Japan Society to show new Ichikawa film here

The Japan Society of Boston, together with the MIT-Japan Science and Technology Program and the Center for International Studies, will sponsor the showing of a new film by Kon Ichikawa, one of Japan's leading film directors, on Tuesday, Jan. 28, at 7pm in Rm 10-250.

Patricia Gercik, program administrator of the MIT-Japan Science and Technology Program, will introduce the movie, "The Makioka Sisters," an adaptation of Junichiro Tanizaki's classic 1938 novel, *A Light Snowfall*. The showing, funded in part by the IAP Funding Committee, is open to the public.

The story of a once-powerful merchant family whose fortunes are declining in the changing Japan of the pre-World War II period, the movie depicts the efforts of two older sisters to find suitable husbands for the younger two.

The Japan Society of Boston has found that film is a valuable means of promoting understanding between Japan and the United States. It hopes to show other Japanese films to the MIT community in cooperation with the MIT-Japan Science and Technology Program.



Debby Wheeler heads up a production number during rehearsal for *Babes In Arms*, scheduled this weekend from MIT's Musical Theatre Guild. In the middle are: Mary Lou Ravese '88, Rina M. Cerulli '86, Hoi Man Siu '87, Cynthia Millington, Wellesley College '86. In the back: graduate student Bobby Fonacier, Kent Borg and Scott Ramsey '89.

—Photo by Dale H. Senechal '81.

MTG to present Rodgers & Hart

Rodgers and Hart's *Babes in Arms* will be presented by the MIT Musical Theatre Guild, produced by Saul Resnikoff and directed by Melinda Fennell.

The musical drama concerns a troupe of young performers who struggle to put on their own original musical revue in the theatre owned by their boss, a greedy tyrant.

It will be staged January 30 and 31 at 8pm, February 1 at 6 and 9pm, and on February 2 at 7pm in the Sala de Puerto Rico of the Student Center. Admission: general \$6, senior citizens and outside students \$4, MIT community \$5, MIT students \$3. Information: x3-6294.

The box office will open one hour before show time on the second floor of the Student Center.

There are 14 in the cast, including two seniors, Rina Cerulli, MIT, and Cynthia Millington, Wellesley College; one junior, Hoi

Man Siu; two sophomores, Mary Lou Ravese and Leslie Melcer; two freshmen, Scott Ramsay and Anna Napolitano; and two graduate students, Steven Schroko and Bobby Fonacier.

Also appearing with them are Lynn Heinemann who works in the Tech Talk office and Denise Cormier of the Ocean Engineering Department. From the Greater Boston community are cast members Debby Wheeler, Courtney Furno and Kent Borg.

Music directors are Barry Mirrer and Louis Toth. Ms. Millington also is choreographer for the production. Others helping to stage the musical are: Carl Dashfield, technical director; Karen Covert, stage manager; Angie Hwang, set designer; Dale Senechal, lighting designer; Rogina Haase, costume designer; Andrea Brandford, properties mistress; and Bill Boyce, publicity director.

Science prizewinners surveyed

The most significant scientific developments of the next decade are likely to be in the areas of genetic engineering and medicine, a survey of past Westinghouse Science Talent Search (STS) winners shows.

Four per cent received undergraduate degrees from MIT, while another four per cent hold master's degrees here. Eight per cent are MIT PhD graduates. (Harvard led in all three categories; MIT was second.)

Westinghouse Electric Corporation, sponsor of the annual competition, commissioned the study to determine how former winners feel about the state of today's science education in the United States, the most pressing problem facing America, and what will be the most significant scientific development in the next 10 years.

As to imminent scientific developments, 21 per cent cited advances in genetic engineering as the most likely next major advance. Also, 19 per cent think a medical breakthrough, such as a cure for cancer or advances in immunology, will be the most important scientific development within this decade.

STS winners have mixed opinions about the most pressing problem facing the nation, although 28 per cent say the threat of nuclear war and the issue of arms control are of foremost concern. Economic problems in the US (11 per cent); social and humanitarian issues, such as hunger, crime and population explosion (12 per cent); moral and philosoph-

ical issues, such as the decline of moral values (10 per cent); and problems of education (9 per cent) were also cited as the country's most pressing concern.

Two-thirds of the respondents think scientists should participate more in contemporary politics. Almost half (44 per cent) believe scientists could contribute expert knowledge to aid government officials in their decisions.

More than half the STS winners (53 per cent) are academics in their professional life. Of these, 27 per cent report that the major source of their income is from college or university teaching.

Considering all aspects of their personal and professional lives, STS winners are most likely to cite a scientific discovery or development as their most important achievement (22 per cent). Fourteen per cent more stated their most important achievement was career success or recognition.

In spite of the increasing complexity of science and the apparent growth of research teams, an overwhelming majority (83 per cent) of STS winners think the individual scientist will always remain important. They say that individuals are the creative drive in science.

One winner wrote that imaginative scientists "rarely have the temperament necessary to participate in a team. The danger is that teams will consume resources greedily, and imaginative people will be denied. A team never displays imagination."

Champion Fellowships established

The Champion International Corporation, with an initial grant of \$25,000, has instituted a program at MIT of Thesis Fellowships in Technology and Policy. The fellowships are intended to assist outstanding graduate students to work in the field of environmental regulation and policy.

Kathleen Bennett, director of regulatory affairs at Champion and formerly assistant administrator of the US Environmental Protection Administration for Air and Water Quality, recently met with students of MIT's Technology and Policy Program to discuss the complexities of effective regulation.

She stressed the crucial need for persons knowledgeable in technical problems as engineers who also understand and can work in the policy environment in which regulations are developed.

The Technology and Policy Program, whose purpose is to educate young men and women

to become leaders in this field, is a graduate interdepartmental program that works closely with the new Center for Technology, Policy and Industrial Development. Under the direction of Daniel Roos, professor of civil engineering and Japan Steel Industry Professor of Engineering, the new center is developing an active role in the issues of industrial wastes and pollution. The Champion Fellowships will be part of that effort.

"It is increasingly clear," said Professor Richard de Neufville, chairman of the Technology and Policy Program, "that we need to pay close attention to how we can best achieve and maintain a healthy environment. We need to look carefully both at the various forms of regulation and at alternatives to it, such as negotiation. We are most grateful to the Champion International Corporation for generously helping us do this research."

Champion, headquartered in Stamford, Conn., is the nation's leading manufacturer of paper for business communications, commercial printing, publications and newspapers. The company, which owns or controls 6.8 million acres of timberlands in the US, is also a major manufacturer of plywood and lumber.

SSC, LSC to bring Carlin

The Student Center Committee has joined forces with the Lecture Series Committee to sponsor a Registration Day appearance by comedian George Carlin.

Mr. Carlin will give two shows, at 7 and 10pm, Monday, Feb. 3, in Kresge Auditorium. Reserved seats are \$6, \$8 and \$10 with MIT or Wellesley ID. Tickets are available in Lobby 10, Student Center Rm 469 and at LSC movies.

Nobelist to speak Jan. 29

Dr. Julius Axelrod of the National Institutes of Health, the 1970 Nobel Laureate for physiology and medicine, will give a special lecture at MIT at noon Wednesday, Jan. 29, in E25-111. The lecture, "Regulation of ACTH Secretion," will be presented by the Whitaker College of Health Sciences, Technology and Management and the Laboratory of Neuroendocrine Regulation, Department of Applied Biological Sciences.



Dara Norman, undesignated sophomore
I took a course in holography and I am taking a course in silk-screen printing and one in self-defense. I am working on collages because I don't get to do that during the year.



David Blanc, graduate student in mathematics
I helped organize Talks on Topology, a series by the Math Department and I went to some other Math Department programs.



Hawoong Hong, graduate student in physics
I'm doing the same thing as ever: working in the lab (in the Center for Materials Science and Engineering).



Bonnie Walters, coordinator of the Writing Requirement
I haven't done anything for IAP yet. But I plan to go to this week's program on Central America.

—Photos by Calvin Campbell

Discovering The American Dance Festival

Tues, Thurs, Jan 28, 30, 4-5 pm, 201 Walker

Leader will share her experiences as student in American Dance Festival Summer School in Durham, NC. Informal discussion and movement workshop. Talk and dance. Sponsor: Dance Workshop. Contact: Nicole Chuang, W16-015, 354-4663.

(New) Microcomputers: Beyond Basics

Simon Lewis
 Wed-Fri, Jan 29-31, 10 am-5 pm, 9-536* Sponsor: Joe Ferreira. Contact: Simon Lewis, 9-152, x3-3535.

(New) American Revolution Battlefield Tour

Major Richard J. Kury
 Wed-Fri, Jan 29-31, 9 am-5 pm, meet in 20E-126. Preregister by Jan 24.

Open to all students but a prerequisite for MS41 military history. Local historical sites, including Hancock Observatory, Boston Tea Party Ship, Raul Revere House, Old North Church, USS Constitution, Lexington and Concord, Bunker Hill, Freedom Trail. Participants pay own Admission fees and lunches. Sponsor/contact: Major Richard Kury, 20E-126, x3-4471.

Changes

1100 Trip To Haystack Observatory
 Thurs, Jan 23, 12 noon, Haystack Observatory (new time)

Millipore Co. Bedford Plant Tour
 Fri, Jan 24, 9:15 am, meet in Lobby 66 (time arranged)

155 Finance In The Construction Industry
 Fri, Jan 24, 2-4 pm, 1-350 (schedule arranged)

5112 Midnite Movies

Tommy
 Sat, Jan 25, second floor, Student Center

Whatever Happened To Baby Jane
 Sat, Feb 1, second floor, Student Center (film titles)

582 Central America: Developing Alternatives To U.S. Policy

Soviet Interests In Central America (seminar)
 Thurs, Jan 23, 12 noon-2 pm, E52-321

Impact Of Revolution On Health Care In Central America (presentation)
 Thurs, Jan 23, 4:30-6 pm, 4-270

U.S. Interests In Central America (seminar)
 Fri, Jan 24, 12 noon-2 pm, E52-321

Alternatives to U.S. Policy In Central America (presentation with Prof. Noam Chomsky)
 Fri, Jan 24, 4:30-6 pm, 10-250
 (schedules arranged)

**Voyager
 in real time**

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Press conferences live via satellite from JPL will be aired over MIT Cable TV as new findings come in.

The Voyager Plasma Science team, led by Professor Herbert Bridge of the Center for Space Research, are eager to know if Uranus has a strong magnetic field. If it does, it will indicate that the planet has an electrically conductive interior, explains Fran Bagenal, visiting scientist at the CSR.

Besides its interior and atmosphere, scientists anticipate learning about Uranus' rotation, and, particularly intriguing, its rings and "shepherding" moons, which corral the particles within the rings, said Professor John Belcher of the CSR.

Cameras on the Voyager 2 have already taken many pictures of the planet but most of the scientific measurements from the 11 experiments on board the spacecraft will be made during the few days around its closest approach.

For people looking for a "hands-on" experience of the Voyager 2 encounter with Uranus, a computer simulation in the Project Athena potluck directory allows the user to ride on the spacecraft and view the planet, its rings and moons as the satellite passes through the Uranian system and beyond into the outer solar system ("usr/potluck/uranus" on a graphics terminal).

JPL Press Conferences

MIT Cable TV and locations below:
 Wednesday, Jan. 22, 1-3pm Rm 37-252.
 Friday, Jan. 24, 1-3pm, Rm 34-101.
 Saturday, Jan. 25, 1-3pm, Rm 37-252.
 Monday, Jan. 27, 1-3pm, Rm 37-252
 Tuesday, Jan. 28 (wrap-up),
 1-4pm, Rm 37- 252

Central America

In an effort to provide an alternative view of political life in Central America and present other approaches that US policy might take, the MIT Committee on Central America is sponsoring a series of seminars, lectures and films this week on topics ranging from human rights to global interests in the area. Speakers include scholars and other professionals, many of whom have first-hand experience in Central America. Consult the Time Table for the daily topics of noon-time seminars and late afternoon presentations.



"Capitol Reef," by Minor White, taken in Utah in 1964. This photograph is part of an exhibition of 102 prints now at the MIT Museum (265 Massachusetts Avenue) until March 29. In referring to works such as the one above, art historian Meyer Schapiro said "Minor White's photographs are works of an extraordinary craftsmanship applied to an image that calls for precision, scale, and finish... The qualities of his best prints are inseparable from the beauty and mystery of his objects; print and scene alike are discoveries by an inspired and loving perception. Through them we divine the man behind the picture, his solitude, his awed vision of a purer world."



Minor White in a 1973 portrait by Robert F. Haiko. Mr. White taught at MIT from the early sixties until his death in 1976. In a pamphlet published by the Museum, former students discuss his "enthraling presence" during his MIT years. A discussion of the exhibition has been running this week on National Public Radio.

Private ownership of highways proposed at transportation forum

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of decaying due to lack of sufficient maintenance." He cited a Congressional study that estimated the need to spend \$720 billion on highways and bridges by the year 2000. But this great need is occurring, Professor Moavenzadeh said, at a time when "governments at all levels are under strong public pressure to not increase taxes. Indeed, this may lead to further tax reduction... It is not at all clear whether sufficient funds will be available to properly maintain our highway system (and) it is not clear that what we do allocate to maintaining our highways will be spent very efficiently."

The institutions responsible for maintaining the highway system—"in many respects... the greatest civil engineering accomplishment of our time"—were established primarily for the purpose of building roads, Professor Moavenzadeh said. But now we have passed from the highway-building epoch to the highway-maintaining epoch and it is not clear, he said, that the institutions which built the highways can switch gears and concentrate effectively and efficiently on maintaining them. In addition, political-bureaucratic incentives tend to work against the maximization of long-range cost-effectiveness in highway maintenance, he said.

"This transition from highway building to highway maintaining certainly calls for a fundamental review of the institutional frame-

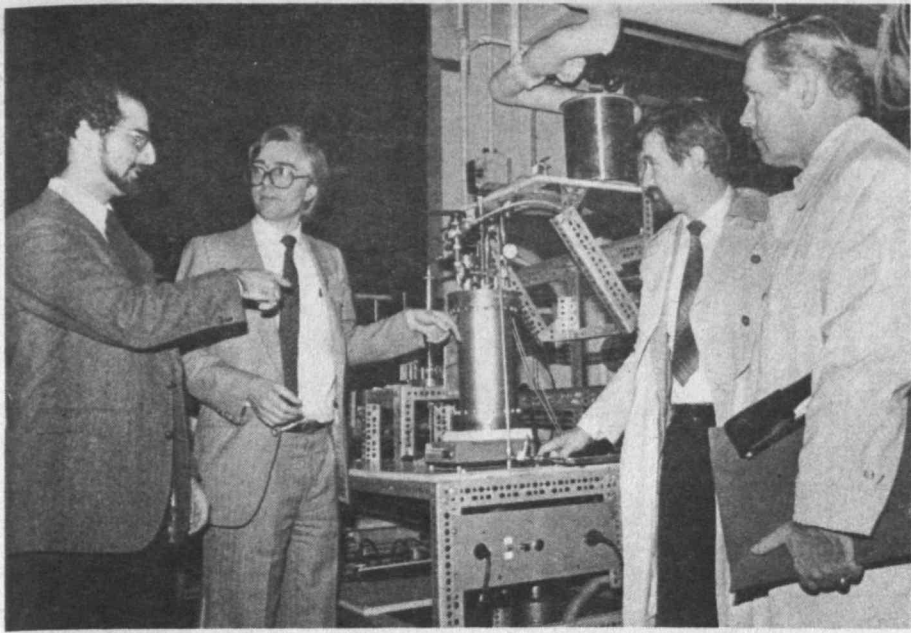
work we use to manage our highways," the MIT professor said.

Private highway owners would be driven by the incentive to maximize profits. This, in turn, would require cost-minimization, leading to long-run cost effectiveness of highway maintenance, Professor Moavenzadeh said.

"This is exactly the kind of objective and incentive structure that we need in order to improve the efficiency of our highway maintenance expenditures," he said. A simplified regulatory control system can be established to ensure that tolls are not necessary and that highways will be maintained to the correct level of physical quality. Private highway owners would be paid by the government for unlimited public access rights.

"In summary, it seems to me that the economic arguments in favor of at least experimenting with some forms of highway privatization appear quite strong. Against these arguments of at least potential economic advantage, I see very little risk of any major calamity resulting from highway privatization. Such unanticipated problems as might manifest themselves would probably be correctable or, if they weren't, we could probably 'back out' of the experiment before any serious damage was done, since highways don't tend to fail suddenly or catastrophically."

Professor Moavenzadeh's paper, "Private Highways: A Proposal to Help Resolve the Highway Infrastructure Crisis," acknowledged the assistance of David Geltner, research assistant at MIT.



The Laboratory for Electromagnetic and Electronic Systems recently conducted a transformer monitoring workshop in connection with its three-year research program to develop advanced technologies for improving the monitoring of large power transformers while in service. The program is sponsored by Allegheny Power System, American Electric Power Service Corp., Boston Edison Co., Empire State Electric Energy Research Corp., New York Power Authority, Northeast Utilities Service Co., Southern California Edison Co., and Tokyo Electric Power Co. Tours of some of the laboratory's research projects followed the workshop. Examining the transformer-oil moisture sensor project above are, from the left, graduate student Mark Zaretsky, Dr. Chathan Cooke, principal research engineer at LEES, Siegfried Tennert of Braun Boveri and John Provanzana of American Electric Power Service Corp. —Photo by Calvin Campbell

Artery substitute aids research

(continued from page 1)

because, unlike real arteries taken from experimental animals that last only a few days in the laboratory, artery equivalents can be kept alive indefinitely," Dr. Bell said. "Thus, the artery equivalent constitutes a totally defined system and, hence, a controlled testing environment."

"For example, we could test how cholesterol levels affect plaque formation on artery walls by running blood with varying amounts of cholesterol through a loop of artery equivalent. Or we could test the effects of prolonged high blood pressure, or other variables."

The artery equivalent is made of three living tissue layers that are roughly the same as the layers in a mammalian artery, Dr. Bell said. The layers are cast, step by step, in a hollow cylindrical mold with a smaller solid cylinder inside.

The gap between the outer and the inner cylinders determines the thickness of the artery's wall. The diameter of the inner cylinder determines the diameter of the opening through which the blood flows.

The mold can also be made any length, depending on how long the artery equivalent needs to be, said Dr. Bell.

The middle layer is cast first. It is made of living smooth muscle cells, taken from a biopsy of an artery. The cells are cultivated to produce large numbers and then combined with proteins, mainly collagen, that comes from calf or pig skin.

Dan Bromaghim

Dan Bromaghim, a staff member at Lincoln Laboratory from 1954 until his retirement in 1977, died January 4. A resident of Burnham, Maine, he was 63. He is survived by his widow, Priscilla, a son and a daughter.

Amedee Gauthier

Amedee Gauthier, 78, of Lowell, a project technician in the Department of Nutrition and Food Science from 1958 until his retirement in 1972, died December 20. He is survived by his widow, Germaine.

"Within a few days the smooth muscle cells have interacted with the protein mixture so that together with it they form a tissue that has contracted around the inner cylinder," Dr. Bell said.

Then a loose Dacron mesh is slipped over the middle layer, which makes the artery more sturdy.

"The Dacron mesh is the only layer of the artery equivalent that isn't living," Dr. Bell said. "The Dacron mesh in the artery equivalent takes the place of the protein elastin in a normal artery. But elastin is hard to work with in the laboratory, and the Dacron mesh works as well."

After the Dacron mesh is in place, Dr. Weinberg and Dr. Bell add a third layer made of collagen containing connective tissue cells, called fibroblasts.

"Like the smooth muscle cells, the fibroblasts act as collecting machines by pulling the strands of collagen tightly together into a tough lattice around the smooth muscle tissue layer that already hugs the inner cylinder," Dr. Bell said.

After two weeks in the mold the lattice is fully contracted, having squeezed out fluid in the process. The artery is ready for the final layer—the inner lining.

Before adding the final layer, the researchers first remove the inner cylinder from the mold. Then they take arterial lining cells called endothelial cells, also cultivated from the original biopsy, and put them inside the artery equivalent as a suspension.

The lining cells attach to and spread out on the artery wall, and become part of the living artery equivalent, Dr. Bell said. The lining cells are alive and function normally, producing proteins usually made by such cells.

Dr. Bell and Dr. Weinberg expect that within five years the artery equivalent will be suitable for human grafting.

(Ms. Seeley is a senior in humanities and science from Newton. She wrote this article while serving as an intern in the MIT News Office.)

Weatherall: Job market is mixed

(continued from page 1)

Reed, responsible for advising students in this area.

The end of January marks the beginning of the busy season for the center. Each year more than 2,000 MIT students, alumni, staff and visitors seek assistance there. "We only have 12 souls in all, two here half of the year, who work in this office—too few actually," Mr. Weatherall said.

One third of students using the office are in MIT's graduate and postdoctoral programs, he said. "Unfortunately, many who did their undergraduate work elsewhere believe our service is only for undergraduates. It's not," he noted.

The center resembles a library, where people can sit at large tables, and pore over annual reports, newspaper advertisements and other job hunting aides. "People can find what they need here. All they have to do is ask," he said.

Each spring and fall, the center publishes 2,800 copies of the Careers Handbook, a collection of career guidance and job hunting tips alphabetized from A to W—starting with "A" for action verbs, i.e., administered, advised and analyzed... to use in resumes—and ending with "W" for working abroad.

Two other booklets it publishes are How to Get There from MIT, a collection of page-length success-story essays written by MIT alumni, and the resume book. These thick volumes of resumes from graduating students and alumni are published annually and sold to firms for a \$200 fee. "These are very popular with companies," Mr. Weatherall noted.

Career counseling is also a vital part of the office. Many students seek help finding a suitable career. Unfortunately, after four years, some students discover they dislike their major, he noted. "In these cases, we sit students down and tell them to relax, think, and find the courage to admit what they want," he said.

Cross-country team in nationals

MIT's men's cross-country team finished eighth among 21 teams at the National Collegiate Athletic Association (NCAA) Division III Championships held recently in Atlanta, Ga.

This was the team's second best showing ever in the national competition and the highest finish by a MIT squad since the NCAA divided the nation's colleges into three divisions in 1973. A total of 258 schools compete on the Division III level in men's cross-country.

Junior Gordon Holterman of Petersburg, Va., was MIT's top runner at the nationals

Evans is honored

Robley D. Evans, professor of physics, emeritus, has received the William D. Coolidge Award from the American Association of Physicists in Medicine. Dr. Evans, whose contributions to medical physics have spanned half a century, made significant contributions in both radiological and nonradiological areas. An authority on radium poisoning, he pioneered ways of measuring radium exposure and developed techniques for the control of radium exposure in industrial areas. He also played a key role in initiating the nuclear medicine program at Massachusetts General Hospital, using radio-iodine for diagnosis and therapy of thyroid disease.

placing 34th among 176 competitors. Others participating in the race were graduate student Will Sauer of Naperville, Ill., junior Turan Erdogan of Bethlehem, Penn., junior Terry McNatt of Middleton, Wis., sophomore Anton Briefer of Millford, N.J., and sophomore Rod Hinman of Lewiston, Idaho.

"We went out conservatively and worked our way into the thick of things," said MIT coach Halston Taylor. "Our goal at the beginning of the season was to finish in the top 10 at the nationals and we did it."

"We had more depth this year, and two or three lead runners which we've lacked in the past. Our time spread from runners one through five was consistently in the 20-second range."

MIT posted an 8-0 record in dual/tri-meet competition for its second straight unbeaten season. In addition, the Engineers finished ninth among 30 teams at the open New England Championships held in Boston. MIT also won the Engineer's Cup over RPI and WPI for the third straight year (and fourth time in five years, and 15 of the 23 times the meet has been held).

In four years as head coach, Taylor's teams have compiled a 24-4 record for an impressive 85.7 winning percentage. Since 1976, MIT is 51-20 in men's cross-country (71.8 percent).

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←Here & There→

MIT political scientist **Richard J. Samuels** is the new editor of a newsletter—on freshwater fishing, of all things. After enjoying fishing in a casual way much of his life, he called the Massachusetts Division of Fisheries and Wildlife several years ago to find out how he could learn more about the sport. That plugged him into a program called "Urban Anglers" and ever since he and his son, Brad, now eight, have been active anglers for bass, trout and the like. Recently Professor Samuels took over the program's "Short Casts" newsletter and Brad, "who likes to draw," became the "staff artist." What's their favorite fishing spot? "We like to go out in our small canoe in the Sudbury River," Professor Samuels said, adding that the river yields "a lot of different fish." Dr. Samuels, one of the nation's leading experts on Japan, was instrumental in organizing the MIT-Japan Science and Technology Program. He's the Mitsui Career Development Professor and associate professor of political science.

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Morgan Memorial Goodwill has elected MIT economist **Lester C. Thurow** to its board of directors. Morgan Memorial helps handicapped and disadvantaged people by expanding their opportunities and occupational capabilities through various services it sponsors.

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Postscript: Two MIT faculty members are back home after taking part in a joint US-China expedition on what had been the world's second-highest unclimbed mountain, Ulu Muztag in China, near the Tibetan border. Professors **Burrell C. Burchfiel**, 51, a structural geologist, and **Peter Molnar**, 42, a seismologist, were a day away from reaching the peak when two Chinese members of the group who already had reached the peak fell onto a glacier while returning to camp. Burchfiel and Molnar helped rescue them, but the lost time meant that the US group's assault on the peak had to be called off.

"We were at the highest camp, about 21,000 feet, and were going for the peak the next day," Professor Burchfiel said. But that disappointment did not spoil an otherwise "exciting" adventure that produced some interesting scientific data—the real reason the two MIT faculty members were on the trip. "We discovered some very peculiar types of granite never before found in northern Tibet," Dr. Burchfiel said, "and we also located an oceanic suture line where pieces of the continental crust had closed, and some remnants of oceanic rock in between."

Professor Burchfiel said the group slept in tents—clothed and in sleeping bags—in temperatures that went to 10 below zero. "We were cold for so long," he commented, "that I can barely feel the ends of my toes even now."

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A cable television film adapted from a geopolitical scenario by political science Professor **Lincoln P. Bloomfield** was the winner in the Dramatic Special category at the Awards for Cable Excellence presentation in Los Angeles last month. The movie, "Countdown to Looking Glass," in which Professor Bloomfield appears as a commentator, also won a Venice Film prize. The HBO-produced, 90-minute drama tells the story of nine days of international intrigue that propel the world toward nuclear war. It will be shown for IAP by the Center for International Studies from 9-5 on Tuesday, Jan. 28, in the CIS Seminar Room 1 (E38-615).

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An MIT management professor, **Thomas J. Allen**, has begged to differ with a collegiate athletic official who suggested in a New York Times opinion piece that the sale of skybox tickets—threatened by the elimination of tax deductions for corporate purchasers of the boxes—is essential to the survival of intercollegiate sports.

"Many schools are able to support extensive intercollegiate programs without the benefit of big-time revenue producing programs," Professor Allen, chairman of the MIT Athletic Board, said in a letter to the Times. He added that MIT supports "36 varsity intercollegiate teams, 13 for women and 23 for men (in addition to 35 club teams). This is without the benefit of skyboxes or even season tickets. In fact, we charge no admission to any of our events. Our football team will never play in a Rose Bowl, and our basketball team is unlikely to make the NCAA Final Four. Nevertheless, our overall won-loss percentage is well above .500, and when it comes to participation of the student body we are at the top."

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Mark Harvey, lecturer in music, recently presented a paper on "Charles Ives and American Civil Religion" at the annual meeting of the American Academy of Religion. He also was recently named a Fellow of the Society for the Arts, Religion and Contemporary Culture.

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Dr. **Thomas H. D. Mahoney**, MIT professor of history, emeritus, will become a member of the board of directors for the Centre International de Gerontologie Sociale in Paris at the organization's annual meeting this month. Dr. Mahoney, who has served as New York and Washington representative for the organization, was a panelist at the 1985 World Health Organization and Nongovernmental Organizations joint session at the World Health Assembly in Geneva. As a consultant to the United Nations, Vienna, he was its Aging Unit's representative at the Inter Parliamentary Union conference in Ottawa and will serve in a similar capacity at IPU's spring meeting in Mexico City. As a member of the UN's Nongovernmental Organizations Committee on Aging, New York, he recently coordinated a symposium in connection with the XIIIth Congress of the International Association of Gerontology.

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An MIT alumnus, Dr. **Carl S. Schneider**, has been appointed director of research at the United States Naval Academy. Dr. Schneider, a member of the academy faculty since 1968, received a BS degree from Johns Hopkins University in 1963, and both an SM and PhD in physics from MIT.

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PRESS CLIPPINGS:

—The Worcester Telegram reports that management professor **Michael S. Scott Morton**, director of the Sloan School's "Management in the 1990s" program, looked ahead to the year 2000 for a New England Council conference on New England's business future. To be successful, he said, corporations will have to adapt to changes in information technology related to the advancement of video conferencing, personal computers, fiber optics technology and related products. The amount of information power available to a company is increasing at a rate of 20 to 30 per cent a year, he added.

—MIT computer scientist **Joseph Weizenbaum** has struck another blow for literacy in a letter to The New York Times responding to a statement by a National Science Foundation official that public schools should devote considerably more time to mathematics and science. "If our lives are not to be controlled by chemicals and computers," Professor Weizenbaum wrote, "our schools had better get on with what is their overwhelmingly most important task: teaching their charges to express themselves clearly and with precision in both speech and writing; in other words leading them toward mastery of their own language. Failing that, all their instruction in mathematics and science is a waste of time."

—In a talk at the University of Dubuque, reported in the Des Moines, Iowa, Register, MIT economist **Paul Samuelson** had this to say about farming in that state: "Many people are going to be leaving farming and many (farms) are bankrupt. Those that are not will have to be restructured. What will be left will be some very efficient Iowa farms. But a lot of marginal farms once thought to be prosperous—often with new grads going onto them—aren't going to be viable."

—Beverly Times columnist **Hazel Davenport** reports that **Weston Burner**, who was director of MIT's Information Processing Services before his retirement in 1984, has been doing double duty as a volunteer in the town of Hamilton, where he lives—teaching woodworking in a "School's Out" program at the Hamilton Community Center, and serving as a surrogate "grandfather" in a program for grade-school children. He also put his expertise in computers to good use, the columnist writes, working on the town's computer study committee and helping install three computers in the Town Hall.

—The Boston Herald reported that a 14-year-old Holyoke boy whose parents left the Soviet Union to give him better educational opportunity has been offered admission next fall to MIT. **Alexander Gorodisher**, who came to this country when he was five and now attends Wilbraham-Monson Academy, told the newspaper he plans to study math at MIT, along with a "second major," perhaps "in physics or laser optics." The Associated Press distributed the story, along with a picture of the youth.



CREWEL WORLD—Milda Richardson, center, a staff member at the Laboratory for Nuclear Science, demonstrated embroidery stitches for Jean Flanagan, also of LNS and Carolyn Lee, a senior in mechanical engineering in an IAP class last week.

—Photo by Calvin Campbell

Anouilh melodrama to open Feb. 6

An unusual melodrama which will have its own orchestra for musical effects will be presented on two successive weekends in February as the IAP major production of the MIT Drama Program, directed by Dr. Robert N. Scanlan.

The Cavern, by contemporary French playwright Jean Anouilh, features a cast of 12

MIT students and one staff member, supported by the Drama Program's professional staff and 16 other students working on the special two-level sets, costumes and lighting.

Dates are February 6-8 and 13-15 at 8pm, with a matinee performance February 9 at 2pm, in the Little Theatre in Kresge Auditorium. Admission: \$5; \$4 students/seniors. Information: x3-2877.

The play was written in modern times but is set in the late 19th century as an exploration of the murder mystery melodramas prevalent then. The "Cave" of the title represents the below stairs habitation of servants who work for the aristocratic family living in luxurious surroundings upstairs.

Dr. Scanlan considers it to be a little-known master work. There is a duality in the way it's put together that makes it extremely stimulating intellectually, he said.

"The real genius lies in having—on the one hand—pure theatricality which draws on both the cheap tricks and great discoveries of the old melodrama convention—and on the other hand—the rather intense intellectual exploration of the art of playmaking," he said.

Dr. Scanlan said it provides the audience with two real focuses of attention. "You watch a play being made by a modern playwright who is showing you the elements of the craft and you get a great potboiler, too."

One of the characters is the author of the play being staged—he constantly intrudes, even starting it over at one point. Among other things that involves bringing back to life a cook who has been murdered and trying various other approaches to solving the dilemma being created.

A new element being introduced will be a live chamber orchestra to accompany the action and heighten the melodramatic elements. The orchestra will be conducted by Astrid Kral '89, who is designing and arranging special music and musical effects.

The production uses Lucienne Hill's translation.

Graduate student G. Albert Ruesga plays the butler, while Sue Downing-Bryant '86 is the "Lazarus" cook. The author is played by Wayne Heller '86.

Other roles are taken by Jean Alpers, David Altshuler and Kerry O'Neill, all '86; Brian Linden and Julie Theriot '88; Amy Dewling Mitchell, Wellesley College '88; Derek Clark, Michael Malak and Matthew McCarty '89; and Lincoln Lab staff member Brian C. Pierce.

Sets have been designed by William A. Fregosi and technical director is Edward S. Darna, both technical assistants in the MIT Drama Program. Coordination and production assistance comes from Jeanette Mitrano, administrative assistant for the drama program.

Stage Manager is Greg Greeley '86. Light crew chief is Samuel Lippert '88, who works with student light designer David Waldes '89 and Frank Revi '86, Andrew Miklich, Drea Brandford, Ms. Theriot and Patti Zeitler, all '88.

Other backstage leaders are properties master Robert Gates '89, properties assistant Jo Ellen Tuttle, and student set designer Sanjay Govindjee '86.

The costume crew, led by Margaret S. Hall, technical assistant in the Drama Program, includes Yasmine Eleftherakis, Maria Tavla and Shava Nerad '89.

The set crew includes Karen Rothkin '87, Shawn Mamros, Amitabh Lath and Tracy Holloway King, all '88 and Aaron McPherson '89.

Rubin heads new group

Lawrence W. Rubin is the first chairman of the new, 750-member Instrument and Measurement Science Group organized within the American Physical Society. Dr. Rubin is head of the Instrumentation and Operations Division at the Francis Bitter National Magnet Laboratory.



"Self-Portrait 1981" by the artist Mary Ahrendt, one of the works in the "Nude Naked Stripped" exhibition on view until February 2 at the Hayden Gallery of the List Visual Arts Center on the entry floor of the Wiesner Building. The concluding programs in a special lecture/discussion series accompanying the exhibit will occur today and tomorrow (Jan. 22-23). "Leathergirls Just Wanna Have Fun," a slide/tape work by artist Suzanne C. Shepherd and writer Donna Turley, a co-founder of Feminists Anti-Censorship Task Force (FACT), will be presented tonight at 7 pm in the Wiesner Building's Bartos Theatre. "The Art and Politics of the Nude—Past and Present" by George Stambolian from Wellesley College's Department of Art History will be presented in the Hayden Gallery tomorrow at 1 pm. Students and all members of the community are invited to these events. The exhibition and programs were organized by the MIT Committee on the Visual Arts, which also published a special catalog.