

NEWSLETTER

Vol. 9, No. 1, April 8, 1991

Historic Building 58 Torn Down

As though it was a healthy tooth being pulled from the mouth of a giant -- building 58 held on to its roots. It seemed to take weeks to knock the building down. The asbestos workers peeled each layer and then a huge wrecking crane socked the building with debilitating blows. But the building stood strong as though it planned on surviving these blows. Even now the damage remains to the cement walk entrance near the East garage and to the blacktop behind where the building stood -- a victory somehow for the past. The hole in the giant's mouth has healed and the spot is now filled with rolled out green grass like a cemetery with no marker.

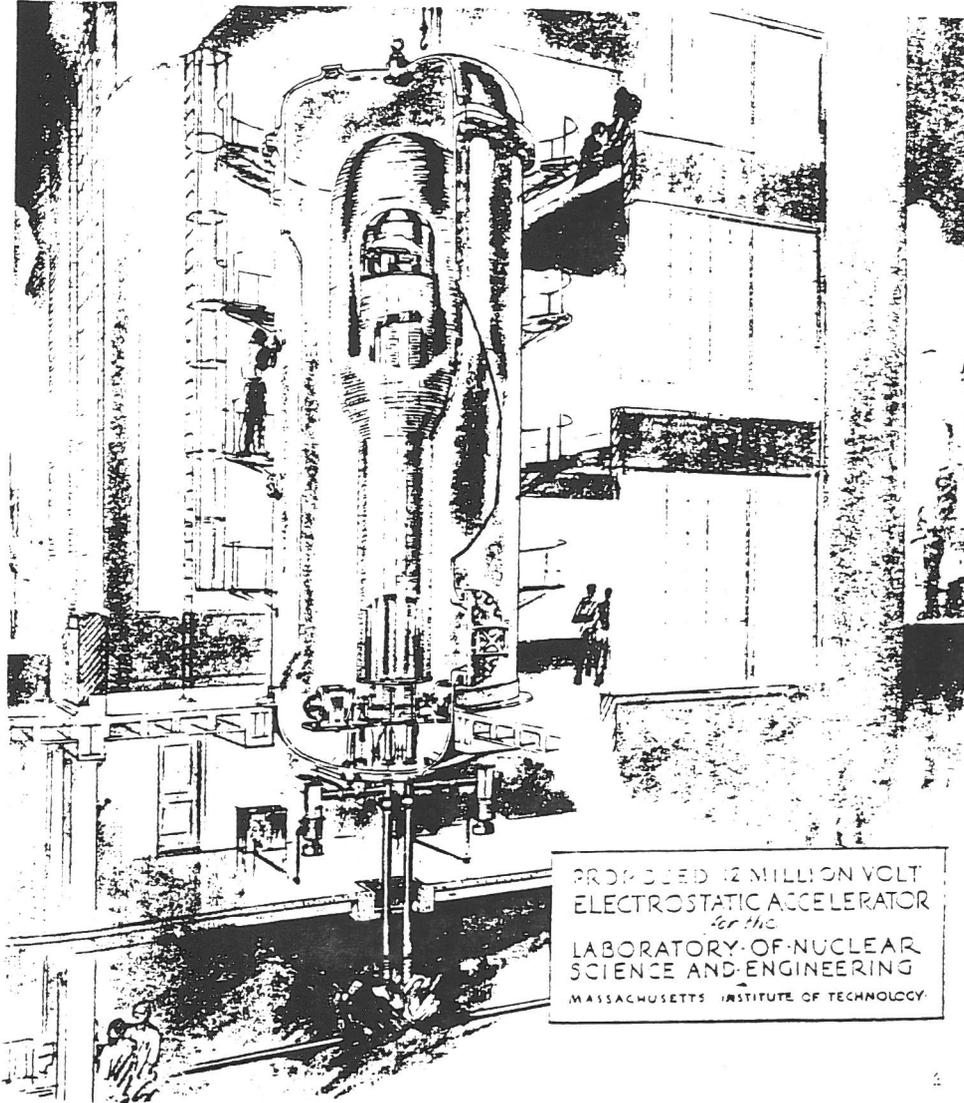
The building once housed the 12 MeV Van de Graaff accelerator (electrostatic generator) which was finished in September 1950. This was in the days when Jerrold R. Zacharias was director of the Laboratory and Peter Demos and Dave Frisch were assistant directors and the lab was called the Laboratory for Nuclear Science and Engineering.

Basically, an electrostatic generator was a machine capable of accumulating electric charge in such a way as to produce extremely high voltages. The electric charge, sprayed onto a traveling belt, was collected on a rounded metal terminal supported on an insulated column. Nuclear particles were introduced into an evacuated tube, one end of which lay in the charged terminal. The particles, progressively accelerated and focussed as they passed down the

tube away from the terminal, emerged from the machine as a sharp beam at high velocity. By pressurizing the atmosphere surrounding the generator column and terminal it was possible to make the machines compact.

In July of 1947 the 12 MeV positive ion accelerator was only a vision. The voltage was to be 2 1/2 times higher than the highest voltage attempted and the inside dimension of the pressure tank housing the generator would be 10 feet in diameter and 30 feet in height. Target material included gold, steel, aluminum, magnesium, copper and lead.

The group that was responsible for the construction of the M.I.T. - Office of Naval Research (ONR) Generator was called the Nuclear Cross-Sections Group and it was led by Prof. J.G. Trump. In



Artist's rendition of the Electrostatic Accelerator- ONR Generator from the *Laboratory for Nuclear Science and Engineering Report, 1947.*

conjunction with this group there was a group that would actually do the research on the machine. The head of that group was Prof. William Buechner. Buechner would lead the group for many years, retiring in 1978.

By September of 1950 the ONR generator was operating at an 8 MeV level and during 1951 a second acceleration tube was added. "The tube was intended for differential pumping on the positive ion source and for the acceleration of electrons to high energies."¹

In 1952 a 180° spectrograph was moved into the new generator building. This spectrograph was used to study nuclear reactions in light elements. The group also concentrated on studies of inelastic scattering of protons and deuterons from certain light nuclei and on the (d,p) reactions of boron, carbon, and oxygen.

Their experimental work was the basis for the shell model. The shell model is the foundation for much of our understanding of nuclear energy levels and their

properties. Research also began on inelastic scattering from calcium.

Updates were done consistently on the accelerator to improve the stability of the output beam intensity, and installation of heavy lead shielding helped the ion source region. By 1958 other targets such as silver and titanium were being used and deformed nuclei were studied as well as the study of reactions involving the bombardment of neon, argon, and other noble gases.

By this time Harald Enge was working on various kinds of spectrographs and spectrometers. Spectrographs were used to provide a magnetic field for studying charged particles emitted from the nuclear reaction. A spectrograph separated the particles emitted in nuclear reactions on the basis of their various energies and directions of movement. After the magnetic field completed its process of analysis, the particles were detected by the tracks which they left in photographic emulsions. These particle tracks

were then measured microscopically.

In the early sixties the ONR Generator group collaborated with a number of universities on experiments and continued their forefront work. However, in the late sixties the nature of the field changed and the machine was shutdown.

The group started working at Brookhaven National Laboratory in New York. The new Heavy Ion Group had three components in the early seventies: Lee Grodzins and Steve Steadman whose work dealt with heavy ion induced fission; Eric Cosman who worked on quasi-molecular resonances; and Harald Enge who was involved with building spectrographs and spectrometers.

Enge built a multi-gap spectrometer which was later moved to Brookhaven. He also built a Recoil Mass Spectrograph which was the last spectrograph to use time emulsion plates. With the help of Steve Steadman and others, a Recoil Mass Spectrograph was also built for Oak Ridge.

There were two parts to this spectrograph -- a velocity selector and magnet. The velocity selector was installed at Oak Ridge and work was done on heavy ion fusion and barrier fusion experiments.

The last research work done in Building 58 was by Lee Grodzins who has worked on devices for the detection of radon gas, and by the department of chemistry for a small project. Eric Cosman also used Bldg. 58 for medical related physics work. *jpf*

Ref.: 1) LNS
Progress Report,
1950, p.36.

Staff Notes

Promotions

Richard Capodilupo, Bates, promoted to Tech A.

David Lations, Bates, promoted to Tech A.

Marjory Neal, Heavy Ion Group, to Project Tech.

Joanne Sayers, Heavy Ion Group, promoted to Administrative Assistant.

Donna Sears, Purchasing, promoted to Administrative Assistant.

Douglas Warnock, Bates, promoted to Senior Tech.

New Staff

David Ben-Efraim returns to Bates to spend his sabbatical here. David is an Electrical Engineer at the Israeli Armament Development Authority. He will be supervising the electric contractors working on the Storage Ring.

David Costa is a former Draper Laboratory employee who now works at Bates. He is a Design Draftsman working primarily on the South Hall Storage Ring. David is enrolled in the Mechanical Engineering degree course at the University of Lowell.

Rolf Ent joins Richard Milner's group working on electron scattering at very high momentum transfer as a test of quantum

chromodynamics. Rolf is from CERN.

Shalev Gilad returns to Bates after spending several years with Cubital Corporation in Israel. Shalev will be working with Bill Bertozzi on electron scattering experiments.

Lauren Gurney, Travel Coordinator, HQ Office. Lauren joins the Laboratory from a travel secretarial position at Hanscom Field.

Frank Hills is a newcomer to the Bates Mechanical Engineering Group. He is a mechanical designer and previously worked at the Aircraft Engine Division of General Electric in Lynn. Frank is attending U. Lowell where he is working toward a B.S. in Industrial Engineering.

Wolfgang Korsch is a postdoctoral associate from Max Planck Institut, Heidelberg, Germany. He joins the Bates staff.

John Lackey joined the Fiscal Office as Associate Fiscal Officer. Since 1986 John has been a consultant with the Fiscal Office and has

been responsible for preparing and analyzing budget information as well as the DOE Cost and Price Analysis. John received a BA from Colorado College and a Masters in Accounting from Northeastern University.

Ann Lees transferred from the Department of Chemistry to join the CDF Group.

Tilmann Reichelt is on sabbatical from Bonn. At Bates, he is working primarily on the determination of the electric form factor of the neutron (Experiment #89-04).

Neven Simicevic from the University of Zagreb in Yugoslavia will work with Bob Redwine on the Large Angle Detector System (LADS) and the Bates Large Angle Spectrometer Toroid (BLAST).

Stan Sobczynski comes to Bates from Fermi National Laboratory. He is a Mechanical Engineer and is currently working on the South Hall Storage Ring.

Defa Wang joined the Bates staff as an RF Engineer. Recently he held a position at the Stanford Synchrotron Radiation Laboratory (SSRL) where he was involved in the development of the RF gun, the commissioning of the linac modulators, assembly and commissioning of the linac sections, and the 358 MHz RF system for the booster synchrotron.

Terminations

John Gostanian (1962) and **Nick Saia** (1947) have retired from their drafting boards. John is basking in the Florida sun and Nick is traveling and playing every golf course in sight. **Jean Hudson** (1965) retired her telephone and *Official Airline Guides* for a new life in Georgia. **John Nelson** has left Bates to work at Symbiotics, Inc. in Cambridge. **Don Souza**, Technical Artist, is living in Falmouth and working in his family's business.



**NATIONAL
SCIENCE
&
TECHNOLOGY
WEEK '91**
APRIL 21-27

NSF Grant Awarded

Prof. Ernest J. Moniz, Bates director, has announced the award of a National Science Foundation Grant to partially support a Teacher Enhancement Program which will begin this summer at Bates.

The program is for high school physics teachers who would like to increase their knowledge in nuclear and particle physics. The two-fold program begins with the Summer Project which will lay the groundwork for a Fall Lecture Series. Three experienced high school teachers will work this summer as a team with mentors from the MIT faculty and staff to draft a Resource Manual and refine demonstrations. The manual and demonstrations will be used during the fall series. Three local teachers have been chosen to participate in the summer program.

The fall lecture series will include twelve team-taught lectures by MIT and Northeastern faculty and staff, demonstrations, and question-and-answer periods.

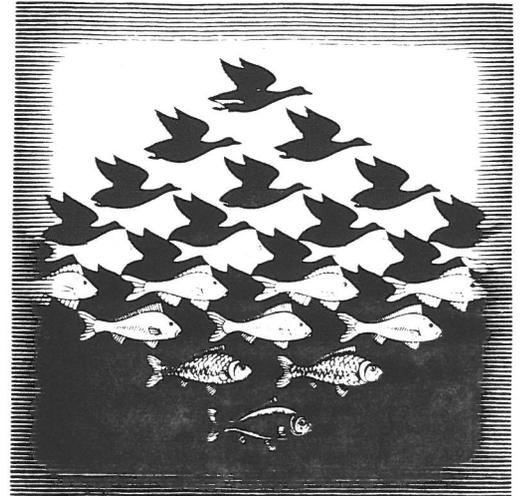
The coordinator for the Teacher Enhancement Program is **Dr. Betty Orrick Sapp**, a graduate of William and Mary with extensive experience in physics research and teaching. Additional funding for the program is being sought from the U.S. Department of Energy and the American Nuclear Society.

In Memoriam

Carl Barber, Prof. emeritus of physics died in Ft Myers, Florida on November 11, 1990. Barber was born June 10, 1919 in Logan Utah. He grew up in Logan and graduated from Utah State University in 1940 and received a Ph.D. in Physics from the University of California at Berkeley in 1948.

During World War II he worked in Oak Ridge, TN on the Manhattan Project. After the war he became Prof. of Physics and Director of the High Energy Physics Laboratory at Stanford University.

While at Stanford, with the aid of a grant from the American Cancer Society, he built the first medical linear accelerator for the treatment of cancer at the Stanford Medical School.



He also pioneered the work on Storage Rings for electron-electron scattering which allowed physicists, in the USA and abroad, to perform new investigations of the fundamental nature of matter. He held a number of visiting research appointments in Germany, Brazil, France and the U.S.S.R.

In 1968 he left Stanford and became a member of the MIT physics faculty. He taught physics and did research on the Bates Linear Accelerator. He lived in Lexington with his wife Katie, until April 1990 when he moved to Florida for health reasons.

Dr. Barber was buried in Logan, Utah. He is survived by his wife Katie, four daughters, and four grandsons.

Property Update

Dave Kelley and Earl Haywood, Assistant Property Managers, wish to thank you for your cooperation and support in the MIT/LNS inventories at Bates and campus. A follow-up will be completed soon.

Eighteen months ago Dick Adams recommended that we contact Dave Osborne, formerly of LNS and currently at Boston University, to seek his guidance in securing more excess government equipment than through our regular channels. Dave put us in touch with Al Urbanowitz at the General Services Administration, Boston Office, who assisted us in securing a GSA ID to gain entrance to thirteen industrial and military installations in our area. A wide variety of office and research equipment have been obtained.

We improved and expanded our regular procedures for getting

excess equipment from DOE's Reportable Excess Automated Property Systems (REAPS) monthly catalog and through Earl Fuller and others of the MIT's Property Office we secured excess equipment from their warehouse, other MIT departments, Lincoln Lab, Mitre Corp., Draper Lab, and the Mass. State Surplus Property Warehouse.

With your cooperation, wish-lists, and requests, and the transportation support of **Bob Calileo and the General Services Group**, we have made it possible for Bates and campus to secure needed and usable equipment with an original value of \$614,439 and a current replacement cost of approximately \$1,000,000, all for the minor expense of some shipping.

We would still like to hear from you for your requests and wish-lists. Call Earl Haywood or Dave Kelley at 3-2385 or 183-338.

--Earl Haywood

Softball Plans Underway

It's Softball time again. The Lab team, **NonSense**, is looking for players. If you are interested in participating contact team **Captains John Lackey at 8-5443 or Ernie Bisson at 183-218. Captain Emeritus Earl Haywood** is in semi-retirement as a captain this season but will be available to pass on information. So sign up for another action-packed season of MIT softball.

LNS was represented in the MIT Community Summer Softball League last summer after a five year absence.

The team chose the name **LAB NONSENSE** and it was a serious slow-pitch team. Team t-shirts were provided by the Laboratory through the Headquarters Office.

The 22 team members included faculty, staff, and students. Earl Haywood and John Lackey were co-captains.

The record was 3 wins and 7 losses in Division

5 (of seven divisions). The team batting average was 504.

The team also played two games with Bates, beating them for the first time 19-13. The second game was at Bates. The Bates team got even by winning 23-17.

News from Bates

by Bill Lobar

Volleyball at Bates

Last summer, an avid group of athletes played volleyball at lunchtime. The competition was fast and furious to the point that the teams even played after work. **Rich Coviello** obtained initial funding and organized the activity.

Most Bates employees joined in a volleyball "mini-tournament" during a laboratory cookout in September. Helping to make the day a great success were: **Clark Johnson, Peter**

Binns, Hamid Moazedni, John Mumley, Rich Campbell, Jed DeCobert, Steve Bradley and the three amigos, Larry Solheim, Larry O'Brien and Larry Longcoy.

Construction Notes Here and Elsewhere

There's no respite for **Mike Karaffa**, Physical Plant Engineer at Bates. Having just finished the conventional construction engineering on the South Hall Storage Ring, Mike was immediately drafted to work on the expansion underway at MIT's Haystack Observatory in Westford. He must be doing an outstanding job.

Recent Theses

Ph.D. theses were conferred upon the following students in 1990 for experiments performed at Bates:

Krishna S. Kumar (Syracuse) - "Parity Violation in Elastic

Electron Carbon Scattering." Krishna is presently working at Harvard and CERN.

John Nelson (MIT) - "Charged Pion Photoproduction from ^{10}B ." He is now employed at Symbiotics in Cambridge.

Gerard Garino (Northwestern) - "Proton Propagation Studied through the A-Dependence of the $(e, e' p)$ Reaction in the Quasifree Region." Gerard is presently continuing at Northwestern.

Out-of-Plane Spectrometer Status

The OOPS collaboration met at Bates in early December to map out plans for 1991. Discussing various aspects of the project were: **Larry Bartoszek, Reinhard Beck, Steve Dolfini, Joe Mandeville and Costas Papanicolas (University of Illinois); George Dodson, Joe Dzengeleski, Maurik Holtrop, Tom McIlvain, Larry Weinstein and John Zumbro (MIT);**

Rory Miskimen (University of Massachusetts); Dimitri Margaziotis and Marty Epstein (California State at Los Angeles); and Ricardo Alarcon (Arizona State University).

Test of Neutron Polarimeter

A neutron polarimeter, designed and constructed at Kent State, has been successfully tested at Bates. The polarimeter will be used in Experiment #89-04 to measure the electric form factor of the neutron at $Q^2 = 0.255 \text{ (GeV/c)}^2$

Beam Improvements at Bates

In April and May, 1990, three new records were set while running the deuteron electrodisintegration experiment (#87-02). These were the highest beam energy (913 MeV), the highest momentum transfer ($q^2 = 43 \text{ fm}^{-2}$), and the smallest measured cross-section

($4 \times 10^{-40} \text{ cm}^2/\text{sr MeV}$). The measured background was about one-twentieth of this cross-section.

Seabrook Tour

On December 5 and 12, groups of about 25 people from Bates and campus visited the nuclear energy generating plant in Seabrook, New Hampshire. The Tours were arranged by Jed DeCobert, RF Engineer at Bates. The Seabrook people were very hospitable and obviously proud of their facility. I was especially impressed with their efficiency, attention to details, and constant drilling to be able to cope effectively with any unforeseen situation.

DOE Visits Bates

On November 8, a group from DOE visited Bates to discuss possible initiatives by the Center in pre-college education. Bates people at the meeting were Jean Flanagan, Jay Flanz, Bill Lobar, Bob Redwine, Wade Sapp, and Bill Turchinetz. The meeting

was very fruitful and several ideas are being pursued with the main emphasis on a program in nuclear physics for high school teachers. This has already been approved and partially funded by N.S.F.

Peter Demos Honored

On November 9, 1990 Peter Demos was honored by his friends and long-time co-workers at the Faculty Club. Planned by Dave Frisch, the party brought together some retirees and other guests from the MIT Physics Department, LNS, the Bates Users' Group, and DOE. A significant gift of money was given to the Bates Users' group for its annual Peter T. Demos Award. This is given to the "graduate student whose progress in research at MIT-Bates Laboratory best exemplifies the spirit, persistence, and intellectual qualities that Peter T. Demos demonstrated in directing and developing the Linear Accelerator Center."

Lab. Plans Symposium

Plans are underway for a 2 1/2 day symposium on the Laboratory. The symposium is tentatively being called, "On the Matter of Nature" and will represent the Laboratory's accomplishments over the past 45 years. The event is planned for April 1992. A committee chaired by Prof. Lee Grodzins has been established to work on the symposium.

Members of the Committee are: Al Beatrice, Fiscal Office; Robert Bruen, Computer Facility; Robert Calileo, General Services; Naomi Chase, News Office; George Clark, CSR; Mark Damian, Purchasing; Peter Demos, Faculty; Martin Deutsch, Faculty; Sheila Dodson, Bates; Frederic Epling, Associate Director; Bernard Feld, Faculty; Herman Feshbach, Faculty; Jean Flanagan, Communications; Donna Henderson, Headquarters Office;

Arthur Kerman, Director; Louis Osborne, Faculty; Milda Richardson, CTP; Lawrence Rosenson, Faculty; Claude Williamson, Faculty; and David Woodruff, Heavy Ion Group.

A number of Committee members volunteered to help out. It is hoped that this event will be a part of the Inaugural events planned throughout the year to honor President Charles Vest.

Stephans Selected for Inauguration Committee

George Stephans, Heavy Ion Group, was selected by the LNS Steering Committee to represent the Laboratory's Research Staff on the Inauguration Committee. The Inauguration of MIT's 15th President, Dr. Charles M. Vest, will take place on Friday, May 10th at 9:30 a.m.

Next LNS Newsletter is planned for June. If you have any articles you would like to submit please do so by May 17, 1991. If you have any suggestions, comments, etc. please let me know.

LNS Newsletter is a publication of the Laboratory for Nuclear Science for the LNS community. The following individuals contributed their time and energy to this issue: Richard Adams, Frederic Epling, Earl Haywood, Stanley Kowalski, Stephen Steadman, and Arthur Scully.

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