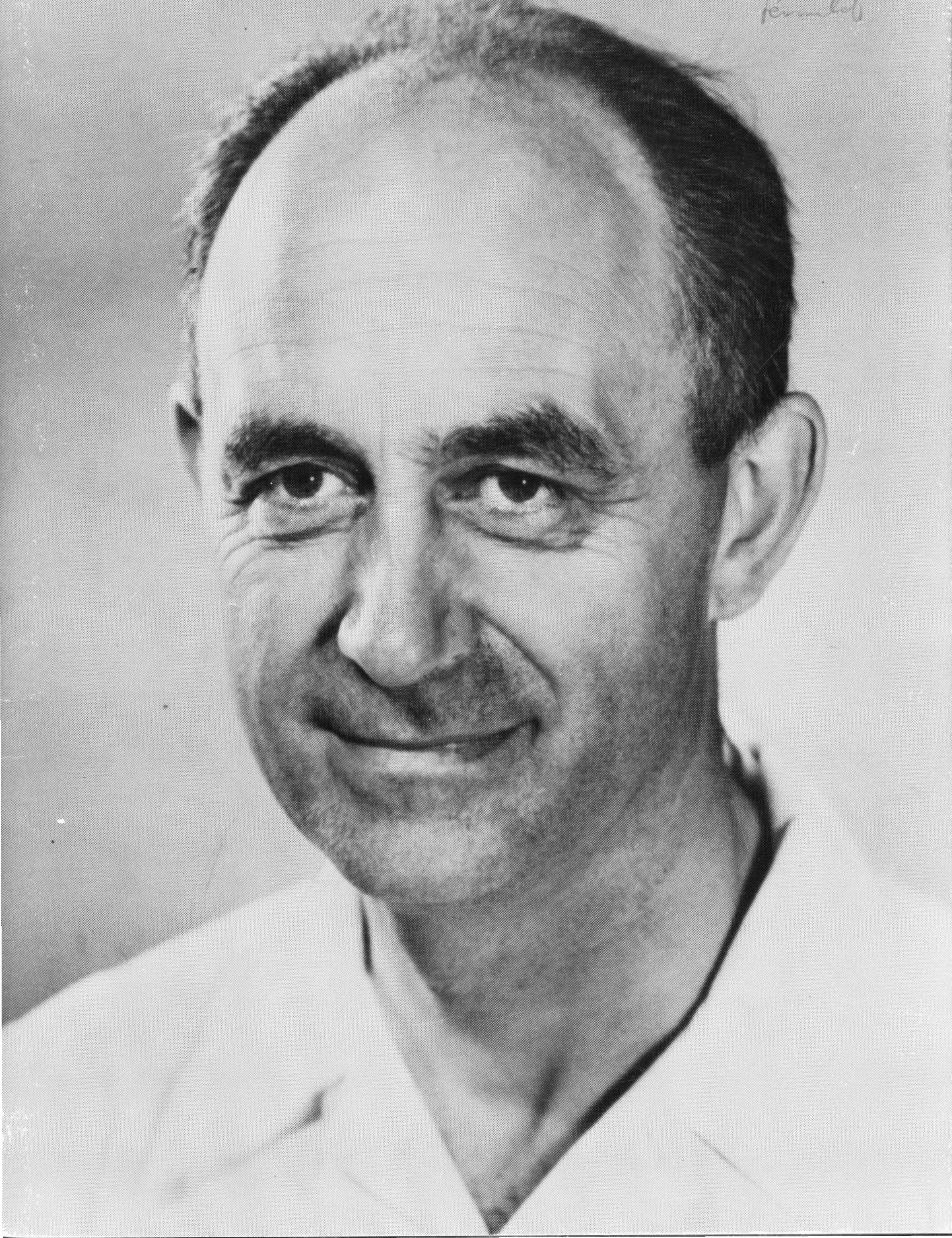

Dedication

Fermi National Accelerator Laboratory

May 11, 1974

Fermilab

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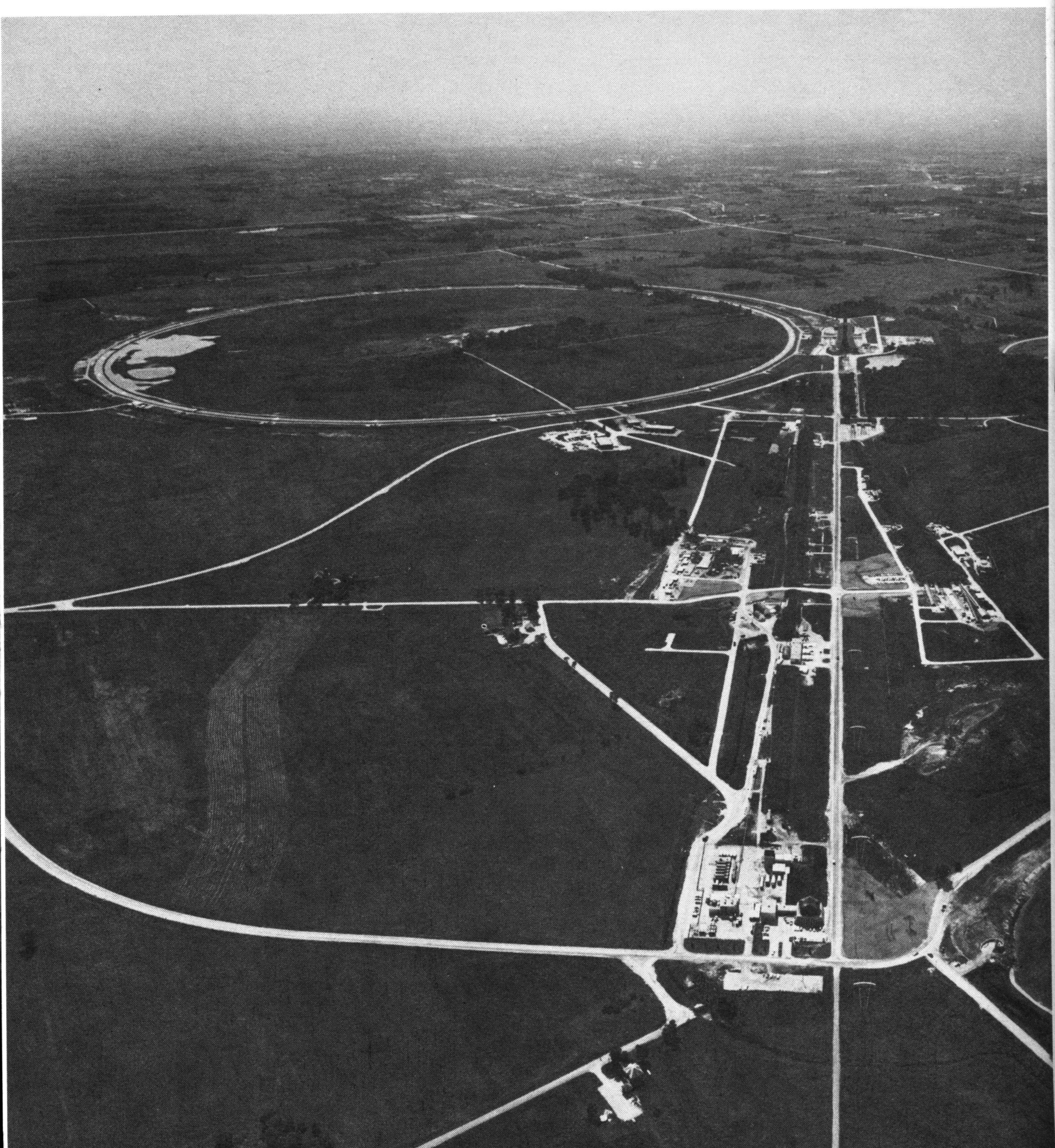


INTRODUCTION

On Saturday, May 11, 1974, the National Accelerator Laboratory (NAL) was officially dedicated to the memory of Enrico Fermi and renamed the Fermi National Accelerator Laboratory (Fermilab).

Fermilab was born in March 1967 when Robert R. Wilson accepted, from Universities Research Association, the position of Director of a new laboratory which he then undertook to form and to build. The first gathering of laboratory staff, about two dozen people, occurred at newly rented office space in Oak Brook, Illinois, about 20 miles west of downtown Chicago, on June 15, 1967.

The 6800-acre laboratory site, near Batavia, was presented by the State of Illinois to the Federal Government in April 1969. On December 2, 1969, the 25th anniversary of the achievement of the first nuclear chain reaction by Enrico Fermi and his co-workers, President Lyndon B. Johnson announced that when the new laboratory was completed it would be dedicated to Fermi.

The accelerator reached its design energy of 200 billion electron volts in March 1972 and by December of the same year had operated at double that energy. By the beginning of 1974 physicists had begun to get glimpses of important new physics discoveries and new data and results were rapidly appearing. Accordingly, May 1974 was chosen as an appropriate time and a promising season for a dedication ceremony.

On May 11 about 1200 people assembled for the occasion. Among the guests were many distinguished members of federal, state, and local governments and agencies, as well as physicists from universities and laboratories throughout the world. Flags were flying representing the twenty different nations which have been actively involved in research at the Laboratory.

The morning was marked by heavy rain. About one-half hour before the outdoor ceremony was due to start, the rain stopped and the clouds were swept away by a strong wind - sufficiently strong, in fact, to blow away chairs, to jeopardize the speakers' platform, and to obscure some of the words of the speakers. To commemorate the significance of the occasion, we have compiled this booklet to put on record the substance of the talks.

Edwin L. Goldwasser

(Mr. Robert Bacher is Professor of Physics at California Institute of Technology, and President of Universities Research Association, Inc. He presided at the Dedication ceremonies.)

Good afternoon ladies and gentlemen. I am Bob Bacher and I would like to extend a cordial welcome to you from the Universities Research Association and from the National Accelerator Laboratory. Today is an important day, and we are very happy to have you all here to see the laboratory and celebrate this occasion.

As you heard this noon, Father Paul was asked to pray to have the rain dispersed by 2:00 o'clock. He made it, all right, with divine guidance and all else for which I have great respect. I would hope that all of you are not wet underfoot or sitting in any puddles. We neglected to ask Father Paul to cut the wind, so it can be blamed on us.

The Universities Research Association, which is composed of 52 universities, came into being in 1965, and by the end of that year the form of this organization had been established. It was not until December 1966, however, that this site was selected for a 200-GeV accelerator which had been under discussion for several years. In January 1967 a letter contract was concluded between the Atomic Energy Commission and URA providing $200,000 for conceptual planning and other preliminary activities. These activities really started with the appointment of Dr. Robert Wilson as Director of NAL on March 1, 1967. From that day on, the work on this project proceeded at a steadily accelerating pace, first with plans and designs, next with construction, and now with operation and particle experiments at high energies. The ground breaking for the laboratory took place on December 1, 1968, with Dr. Seaborg, the Chairman of the Atomic Energy Commission, turning the first spade-full of earth on a cold, snowy day. A little colder than today, I think. On January 22, 1972, the first high energy protons were accelerated and the final energy was steadily increased until protons were accelerated to 400 billion electron volts on December 14 of that year. This is twice the design energy.

Today the accelerator operates for a host of experiments, usually at 300 GeV, and it is not unusual for eight or ten experiments to be carried on at the same time. The peak intensity is, I believe, the highest ever achieved in a proton synchrotron. These are noteworthy accomplishments, and there are a good many people here today in the audience and on this platform who have made important contributions. Of course, the main credit goes to Director Robert Wilson and to the very dedicated staff of NAL, and we congratulate them on their achievements.

This is a time when we can all feel proud of what has been accomplished, but we should remember that the best is yet to come. It is already clear that exciting new results are being obtained and that our knowledge of the structure of matter on the smallest scale is going to be significantly increased by the experiments carried out on this fine accelerator.

I'd like now to introduce those on the platform skipping later speakers. Starting from your left (my right), Mr. John Erlewine. Mr. Erlewine has been associated with this project in one capacity or another for the Atomic Energy Commission ever since the project started. He is now General Manager of the Atomic Energy Commission.

Mr. Edward Creutz was supposed to be on this platform. I see him here in the audience. Will he please stand up? Mr. Creutz is Assistant Director for Research of the National Science Foundation. While this laboratory is supported entirely by the Atomic Energy Commission, a substantial number of the university experimenters are supported by the National Science Foundation.

Congressman Craig Hosmer. Congressman Hosmer is the Representative from the 23rd District of California. He has been a very active member of the Joint Committee on Atomic Energy for nearly 20 years. He has always been much interested in research and with his decision to retire after the present Congress he will be greatly missed.

Mr. Norman Ramsey. Mr. Ramsey was elected President of the Universities Research Association shortly after it was formally organized, and served in that position for more than seven years. He is now past-president and also, by action of the Trustees yesterday, president-elect.

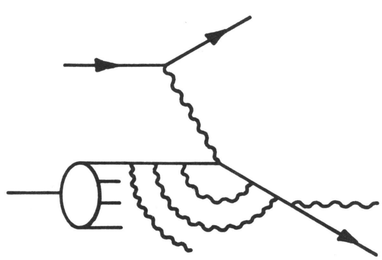
Mr. Geoffrey Norman. Mr. Norman has been affiliated with the Universities Research Association from its earliest days. He is now a Trustee and Chairman of the Board of Trustees.

Congressman Chet Holifield. Congressman Holifield is the Representative from the 19th District of California. Congressman Holifield has been a member of the Joint Committee on Atomic Energy ever since it was established. He has been Chairman of that Committee on several occasions, and has been very active in its work. Congressman Holifield has announced that he will retire from Congress at the end of the present session and it is difficult to think of the Joint Committee without him.

Congressman Frank Annunzio. Congressman Annunzio is the Representative of the 11th District of Illinois. He is a great admirer of Enrico Fermi, and we are very happy to have him with us on this occasion.

Mr. Gerald Tape. Mr. Tape is Ambassador to the International Atomic Energy Agency and President of Associated Universities, Incorporated, our sister institution on the East Coast. At the time URA and this laboratory were being set up he was a member of the Atomic Energy Commission and played a major role.

Mr. John Teem. Mr. Teem is Assistant General Manager for Physical Research and Laboratory Coordination of the Atomic Energy Commission. In AEC, Mr. Teem is responsible for the operation of this laboratory.



THE WHITE HOUSE

WASHINGTON

May 9, 1974

Dear Dr. Wilson:

On the occasion of the dedication of the Fermi National Accelerator Laboratory, I want to express my personal appreciation to you and your colleagues for an outstanding job in building and successfully operating one of the world's most complex machines.

I understand that the accelerator -- the most powerful in the world -- was built within the time forecast and within the cost estimates. I am also told that by means of some rather ingenious technological innovations you have been able to double the planned energy levels. All of this constitutes a most impressive achievement, and you, your staff and the Atomic Energy Commission can take deep pride in your accomplishment.

Basic science is vital to human progress, and I am confident that the Fermi National Accelerator Laboratory will further enlarge our scientific horizons for the benefit of all mankind.

You have my compliments and best wishes, and my warmest congratulations go out to all of the members of your team.

Sincerely,

Dr. Robert Wilson, Director
The Fermi National Accelerator
Batavia, Illinois 60510

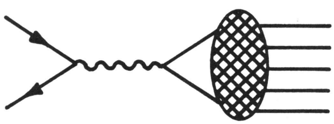
We are very happy that it has been possible for Mr. H. Guyford Stever to be with us today. Mr. Stever is the Science Advisor and is Director of the National Science Foundation. Mr. Stever was associated with Universities Research Association during the earliest days and served later as Chairman of the Council of Presidents. He has kindly agreed to say a few words. Mr. Stever.

Dr. Bacher, distinguished guests, ladies and gentlemen. I am delighted to be here. When I was invited I expected to come to a place with less wind than Washington.

Dr. Bacher, Dr. Wilson, Dr. Ray, The President has asked me to read a few words from a letter from him to Dr. Wilson.

(Quotes from letter opposite)

Dr. Wilson may I present you with this letter from The President.



Charles Percy is the Senior Senator from Illinois and has been a member of the Senate from the beginning of this project. This great site was donated by the State of Illinois, and we have received a great deal of other friendly assistance from the State. Senator Percy has been a strong supporter of this project since its inception. He is our first speaker this afternoon and it is a personal pleasure for me to have him here today, since he is a former associate and long-time friend. Senator Percy.

My long-time friend Bob Bacher, Mrs. Fermi, and my distinguished colleagues in the Congress: Chairman Holifield, we're delighted to have you here, as well as Frank Annunzio and Congressman Hosmer and Mel Price. I think we should also acknowledge the fact that members of the state legislature were extraordinarily important in working on this project, and we're delighted to have Senator Bob Mitchler, who was on this site eight years ago with me when it was still a prairie, and Representative Sam Maragos, and certainly Representative Ray Hudson, and Senator Jack Knuepfer -- we're delighted to have you here. Dixy Lee Ray, we welcome you and, of course, Dr. Robert Wilson.

On behalf of Mayor Daley and all of the other mayors here we welcome you who have long heard of Chicago as the windy city; as you can see, that means Chicago and its surroundings. It's an honor for all of us to be here and an honor that you have paid the State of Illinois, especially those of you who have come from afar.

This laboratory is the culmination of many dreams and countless hours of work on the part of many people. Each of you has a very special reason to be proud to be here today. Those of you who envisioned the laboratory for your work can take pride in that vision and in your effort to make that vision a reality. Those of you who work and study here know better than we laymen that this facility offers extraordinary opportunities to explore the mysteries of the universe. And I know that you are all especially proud today to have this laboratory named the Enrico Fermi Laboratory, and Mrs. Fermi we are honored indeed to have you here today.

In the late 30's, I sat as an undergraduate in the University of Chicago at Stagg Field and witnessed Chicago's last Big Ten football game. By the fourth quarter, with the score 88-0, the first and second squads of Michigan had been sent to the locker room to dress and we were giving the cheer led by Robert David Hutchins: "Don't let 'em get a hundred."

Little did we realize that three years later, underneath the very stands on which we were sitting, in sharp contrast to the dismal failure that we saw on the football field, Enrico Fermi would achieve the first nuclear chain reaction and thus make possible a whole new kind of world. In this laboratory, many physicists who were his students and his colleagues can now continue to labor on behalf of mankind in that spirit of genius, creativity and boldness which so characterized the man for whom this magnificent laboratory is named.

On behalf of Mel Price and all of us who so deeply believed that Illinois was the right location for this facility, I want to say how gratifying it has been that each of the thirty communities in this area locally passed open occupancy legislation; by overcoming those small hurdles, the citizens of this area have made it possible for science to overcome the far greater challenge they face in this laboratory.

All of us can take great pride in the fact that this project has not only exceeded all performance specifications and now offers promise of even exceeding the wildest dreams we ever had, but also actually ran ahead of schedule, and is going to turn back, or make available for use in another way, $30 million that were appropriated in 1969 but not spent on this project. I've never seen anything like it before; I think the record of everyone involved -- designers, contractors, scientists -- offers great inspiration for many, many other federal projects.

It seems that in every way the Fermi Accelerator Laboratory has surpassed its goals. In a less scientific but equally important way the laboratory has contributed to the growth of Illinois. It's a tribute to the developers and the workers that the Equal Employment Opportunity Program has been so successful. I believe that you who study the most common elements in the earth are bound together by bonds far stronger than color or creed, and you by your presence encourage those in this area to better understand that. This laboratory has pulled together people from all walks of life and enabled them to work together in harmony. It is not the least of your accomplishments that you have broken down social as well as scientific barriers.

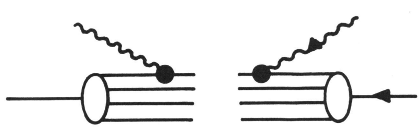
And finally, the laboratory has renewed the nation's appreciation for the role of scientists in our society. For some years, when Americans thought we were being outdone by other countries, there was a great rush to build up our scientific program. Then in the last decade there was a strong and important emphasis on social programs. The scientists were all but left out in the cold. People were interested in people and very little else.

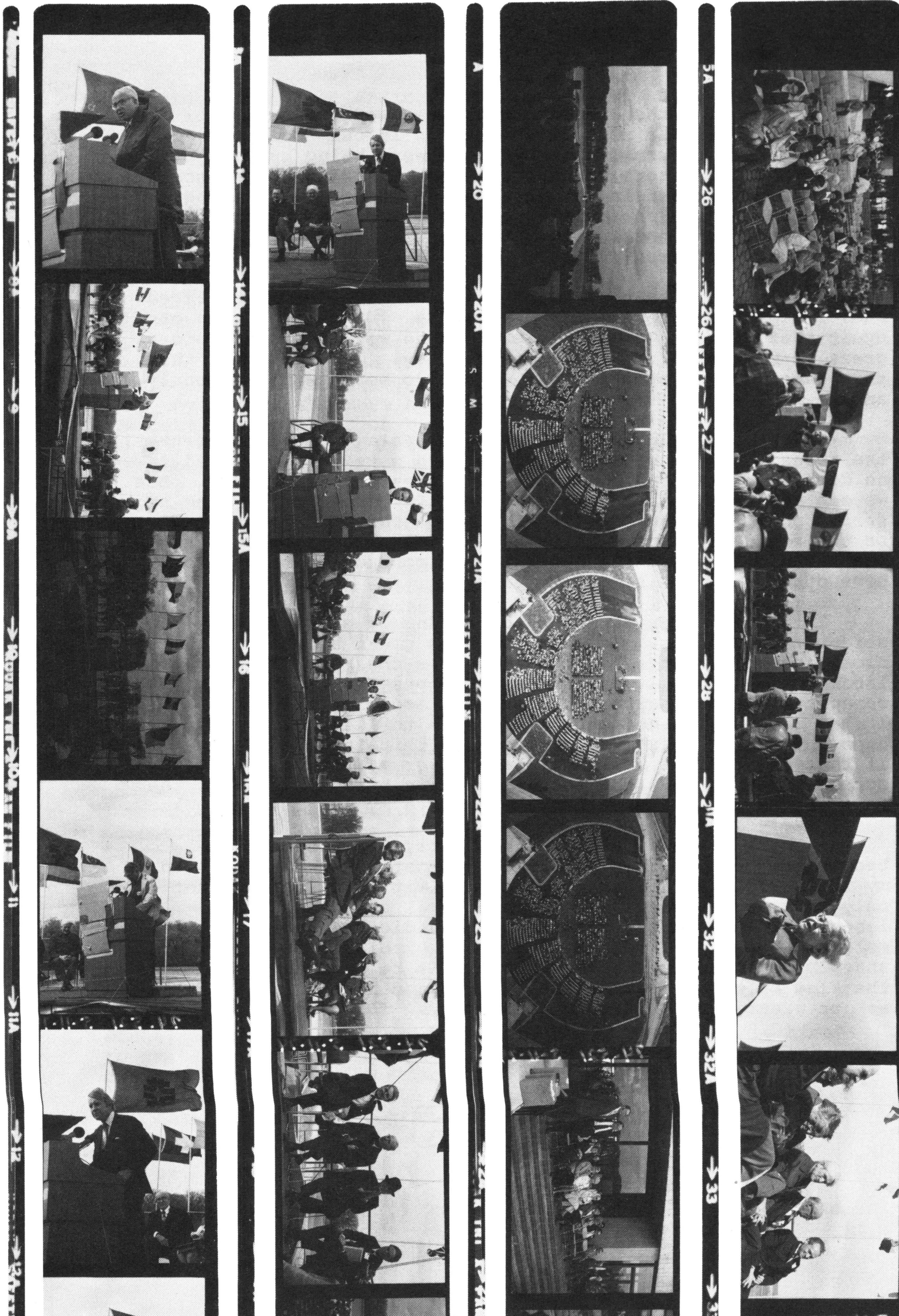
Now it seems that we're moving back into a more balanced and, I might say, less windy atmosphere. We're realizing once again that we need to make scientific as well as social progress if we are to be a complete society. One important thing this laboratory proves is that we can do both, simultaneously, and we can do them very well indeed.

Dr. Wilson tells us that when he was a graduate student, the research that he and his colleagues were doing pointed in no directly foreseeable way to our present nuclear power. But we can see that this is exactly where it did lead us. The high energy physics being done in this laboratory can be expected to be the foundation for a later generation of development, and the technical innovation necessary to conduct this research will have other and more immediate uses.

This dedication marks the beginning of extraordinary scientific advances. It also reflects great social and technical accomplishments. Already we know the Fermi Accelerator laboratory works. It has surpassed hopes for technological capacity. It has surpassed hopes for sociological progress. It has brought further economic growth to Illinois. But perhaps the two most exciting aspects of this laboratory are 1) that we still do not know what its great future potential actually is; and, 2) the fact that it is headed by one of the most gifted and creative men it has been my experience to know.

I think I wooed, along with others, Dr. Robert Wilson to become the head of this laboratory almost as hard as I wooed my wife. I think he has created a spirit that is shown not only in every physical and architectural aspect of this laboratory, but in the brilliant and dedicated team he has molded. Whenever I take the floor to extol his virtues I'm sharply reminded by him that the credit belongs to you; that's the kind of man he is. We're blessed and honored to have him as our great leader of this laboratory. Thank you.





Melvin Price is the Representative of the 23rd District of Illinois. He is one of the original members of the Joint Committee on Atomic Energy, and is now Chairman of that committee. For many years he has been Chairman of the Subcommittee on Research, Development, and Radiation. The Joint Committee has supported this project strongly since the beginning, and we are very happy to have Congressman Price here today to speak to us. Congressman Price.

Thank you very much Dr. Bacher.

Dr. Bacher, Chairman Ray, my colleagues in the Congress -- Frank Annunzio, Chet Holifield, and Craig Hosmer,-- Mrs. Fermi, and Dr. Wilson.

I am very happy to be here this afternoon on this great occasion not only for the people of this area, but for the people of the United States and the people of the world. This event is a culmination of the hopes and efforts of many people, and I am most pleased with the knowledge that what has been accomplished has even exceeded the hopes of many of us.

I recall the study made by the Joint Committee on Atomic Energy in 1967 on the goal that should be established for this, the then proposed 200-GeV machine. In the Subcommittee on Research and Development, recommendations were made. We did not agree with either of the two AEC suggestions that the beam intensity be reduced or the top energy be restricted. We specifically recommended that the full, originally contemplated design intensity be provided for and that the option be built in for increasing the energy to 300 GeV or a somewhat higher stage at a later date.

We thought in our report seven years ago that we were presenting quite a challenge. But here we are at the official dedication of the accelerator and the 400 GeV has already been attained and the intensity is already close to the recommended goal.

I vividly recall Dr. Bob Wilson testifying before our subcommittee, and he was confident then that the goals that we thought should be attained, could be attained. One of my colleagues on the committee asked Dr. Wilson if he thought the government's funding priority should list the need to feed the hungry in this country before an item for this unique facility and the advanced research it enables. Dr. Wilson was quick to reply that the hungry should be fed first. He added the important observation that the mind must also be fed.

Advancement of knowledge by probing the frontiers of science as is being done here, is also necessary along with bread to carry out a God-given purpose ingrained in the brain and spirit of mankind. Bob Wilson paraphrased a biblical axiom that man does not live by bread alone. Already at this dedicatory stage, an extraordinarily fine record has been achieved in relation to cost, time, and excellent results and worldwide pre-eminence.

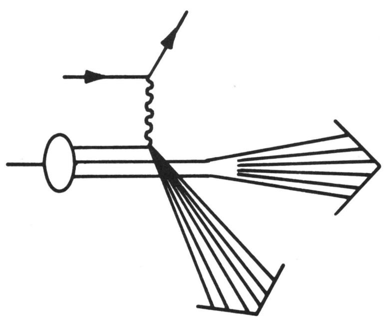
But Dr. Wilson and his outstanding group are not the sort to rest on laurels. They have already started to look to new horizons. Dr. Wilson, in his appearance before the Joint Committee in February of this year, reported on work directed toward the goal of a 1000-GeV machine. In addition to starting technical work in this direction, Dr. Wilson has also initiated steps looking toward authorization of funding for major features of this effort. Such talent and enthusiastic dedication are precious gems in our store of true national treasures.

In this day of "let it all hang out," I must on this joyful occasion mention some bad news. An ominous cloud seems to be developing in regard to the future of basic research. Testimony we received this year from several scientists made it clear that high energy physics is not receiving ample support. The data developed during our hearing this year indicated that three of the four high energy labs are at a level of near 50% of their most productive utilization. Although it is true that the National Accelerator Laboratory operates its accelerator 90% of the time, the funding for experimental work there is also at the 50% level.

I view the problem as especially serious this year because of congressional attitudes toward the energy shortage problem. This year all energy items have been placed in a separate appropriations bill which has already passed the House. It contains a sizable increase in the amount of requested funds. The next and remaining part of appropriations which is still to be considered in both Houses included physical research, weapons, and so forth. Now if there is a move to keep the whole AEC portion within the overall ceiling that was originally requested, cuts would have to be made in the parts soon to be considered. So, interested and concerned groups and individuals who write to their Congressmen should keep this outlook in mind.

I want to pay a special tribute to two of my illustrious colleagues on the Joint Committee on Atomic Energy, both of them here with us today -- Chet Holifield and Craig Hosmer. All of you know of their leadership on the Joint Committee and in the Congress, in support of progress in the sciences. You are probably all aware of their plans for retirement. I did the best I could to pursuade both of them to reconsider. But unfortunately for the Committee, the Congress, and the country, they would not reconsider. From my first-hand knowledge of the work and ability of these two outstanding men over many years I can assure you we will experience a great loss not only to the scientific community but also in relation to all national challenges that face us. They will be sorely missed, but in the light of their great contributions and hard work throughout many years, they have surely earned the right to step back from the front lines.

In closing, I simply want to convey my feeling of privilege and deep pleasure to share this happy event with you -- the dedication of the Fermi National Accelerator Laboratory and again to congratulate Dr. Wilson on the tremendous job he has done in directing this project, -- probably one of the first men in the country in many years who has completed a project on schedule and below the estimated cost. Thank you.



Leon Lederman is Professor of Physics at Columbia University and Director of the Nevis Laboratory. He is a distinguished experimental physicist. He has carried out important experiments at this laboratory and at several high energy physics laboratories around the world. For his work in this field he was awarded the Medal of Science by the President some years ago. We are delighted to have him here today as our next speaker. Mr. Lederman.

Dr. Bacher, ladies and gentlemen. I tend to agree with all the previous speakers except for the business about Bob Wilson. He is the one who got me up here, freezing, insecure, without a blackboard, without slides to show, and in a situation in which I feel totally uncomfortable.

It may not seem entirely believable, but I come before you as someone who has never, ever been involved in dedicating a 400-billion volt accelerator. Until the telephone call came which commanded me here, and threatened to cut off our protons, I hadn't even known that those protons were coming from an undedicated accelerator.

Recovering from that shock, I faced an even more disturbing problem. How does one dedicate? Suppose it fails, suppose the dedication doesn't work? All this effort, all this money, and the dedication doesn't take. This is, so far as I was able to learn, unprecedented. I am a more or less active user, a customer of the laboratory, and users shouldn't be called upon for such things. Dedicators, I thought, were older people, statesmen, philosophers, or skilled administrators. They would know how to address this vast and diverse audience of legislators, of government officials, of distinguished guests, foreign and domestic, of the builders and the operators, and their families. Many of you, in your respective ways, have made crucial contributions to the creation of this magnificent instrument of scientific research.

You deserve a more polished and warmer dedication. After the dedication had been properly done, then we users would swarm all over the machine and do our thing. But unconventionality is the norm at the National Accelerator Laboratory, so I prepared a list of things to discuss.

On my list is the history of this project -- the first ideas about accelerating protons to hundreds of billions of volts came, so far as I know, from Matthew Sands and his colleagues at Caltech . . . well over 15 years ago. Then, as we began to learn from the 30 billion volt accelerators at Brookhaven and at CERN in Geneva, it soon became evident that a vast complexity had been exposed in the properties of matter at the subnuclear level, a complexity that our Scientific Culture insisted must be superficial. We had to believe in an underlying order and simplicity. For this, another energy step was required.

The serious technological study of 200 billion volt acceleration was undertaken officially at the Radiation Laboratory in Berkeley (now the E. O. Lawrence Berkeley Laboratory after the inventor of the cyclotron) - Berkeley, California, the birthplace of the entire tradition of modern high energy physics.

I must skim quickly over the kaleidoscope of events that ensued after the announcement that a site was being considered for a 200-billion volt accelerator: the organization of the 45 universities, now 52, into the URA; the search for a director; the redesign with reduced scope, which reduced 200 billion volts to 400 billion volts; all leading to the authorization by the Congress in 1968, beam in 1972, and perhaps the dedication today.

The search for a site deserves special mention on my list. I helped inspect sites in the swamps and plains of Louisiana and Mississippi and the offices of their governors. We watched communities in tortured response to the Atomic Energy Commission's perceptive questionnaire. The Commission asked, "Show your educational, your social, and your cultural worthiness to receive this great instrument and to receive into your community the somewhat curious breed of people who will come with it. Eighty-five communities from 46 states rushed forward to compete. The catalytic effect of their subsequent self-examination in the light of the AEC questionnaire was one of the first invaluable social spinoffs of this project.

On my list are the concerns and doubts often expressed by many of you, by your friends, or by the gifted young students who have, in the past six or so years, deserted in alarming numbers this traditionally irresistible discipline. Of what use, we have been asked, is this adventure, concerned as it is with matters so remote from the human environment? Of what use is this extensive enterprise when society itself is in such disarray? There was even among us the haunting fear that God in his infinite wisdom would not know how to behave at 400 billion electron volts; that in effect we would be creating puzzles for our own amusement and at public expense.

On my list then, is to reassure you that what you have done here is good and beautiful by any reasonable assessment of the activities of a civilized society, that your dedication to this project in all the diversity gathered here, that your long and hard hours, that your periods of deep discouragement when everything seemed to fail in sequence, that the 3:00 a.m. phone call you took for your husband who had just come home from work an hour ago, that your inner doubts in voting these huge monies when there were so many demands, that this effort, this instrument, the fruit of your genius and your labor and your love, that this monument to an incredible faith will indeed serve humanity in the very highest and the most general sense. In other words, to quote Father Paul, "Don't worry!"

If practical applications reassure you, then don't worry. The technological spinoffs from basic research, translated into the gross national product have paid for the research many times over. In the special instance of accelerator building, we can compile an impressive list of items pioneered for the accelerator needs but which find applications in our industries -- for example, highpower vacuum tubes, strong-focusing microscopy, ultra-high vacuum techniques, rf surgical tools, wave guides for therapeutic X-rays, the promising use of pion beams in cancer therapy, superconductivity, the production of radioisotopes.

If we include instruments associated with the use of the accelerators, then the list grows very long -- for example, the circuitry that powers computers, the techniques of pattern recognition and of data processing, the use of the new proportional wire chambers for high resolution X-ray diagnostics and so on -- "so don't worry."

To some of you, the above response may only deepen your concern. After all, this is technology, and much of our social crisis is driven by technology that we already own. We have overpopulation and poverty, and shortages of food, and pollution of the natural environment and the energy crisis, and the crisis of armaments. And, we add, these are only the terrors of the 20th century. Certainly we do not pretend that this accelerator will solve these problems, but we do say that solutions to some of these may come in inexplicable ways from what we do here. We do say, that some of the young students out there will provide the new ideas that a more humane and wiser society can deploy to alleviate these crises. And we do say that it may well be that we just do not yet know enough about nature to cope with the terrors of the 21st century and here, our confidence in what we do in this laboratory is in harmony with history. For in fact, most of you do understand that it is the same spirit and the same quest, the same motivations as we have here which have, in the past hundred years or so -- "mastered the sky and the space above, and drawn communication from the electron, power from the nucleus, doubled the span of life, halved the working day, and created the possibility for enriched leisure, and supported the vast increase in the world's population, and made the night bright, and high-fidelity and electric toothbrushes. There is, in all of this, at least a potential for greater human fulfillment."

To the unconvinced, to the skeptic who says, "Yes, but what have you with your hundred billion volts done for us lately"? I do have an anecdote.

> Data from Brookhaven about ten years ago unsettled the world of physics. In certain properties of K-mesons, the symmetry of charge and parity taken together was violated. Subsequent experiments in many labs provided no elucidation of this esthetically disturbing fact. Motivated by a desire to make this situation more beautiful, T. D. Lee and Giancarlo Wick recently explored the consequences of a highly abstract speculation about the structure of the vacuum, -- that space in which all particles of the world are imbedded. By a sequence of steps, their investigations led to the properties of nuclear matter under abnormal conditions, -- conditions which could perhaps be duplicated in laboratory situations. T. D. Lee wrote: "Hitherto, in high energy physics, we have concentrated on experiments in which we distribute higher and higher energy into a region with smaller and smaller dimensions. In order to study the questions of 'vacuum' we must turn to a different direction; we should investigate some 'bulk' phenomena by distributing high energy over a relatively large volume . . . abnormal states may be created in which the nucleon mass may be very different from its normal value . . . it is conceivable that inside the volume of the abnormal state, some of the symmetry properties may become changed or even that the usual role of strong and weak interactions may become altered . . ."

The possible implications of these ideas are indeed striking, not only in the radical modifications of the very basic notion of the vacuum, the vacuum of Einstein and Dirac, and hence, abstract scientific and philosophical, but also for possible applications. The abnormal nuclear matter of Lee and Wick raises at least the possibility of energy sources up to one hundred times more efficient than nucleon fusion. This theory is speculative and needs much discussion, but an experimental road is clear. An early attempt to glean some confirmation will be made soon at this accelerator. I cite this not to raise hopes, but only as an excellent example of the surprises which could be in store for us.

On my list also is to reassure you about God and 400 billion volts. If you look up there, you discover, or our astronomical colleagues have discovered, that the universe is very much concerned with what happens at 400 billion volts, even at a thousand billion volts. Particles occasionally strike this planet with one thousand million times the energy of even this great accelerator. We learn that a significant fraction of the energy flux out there lies in and above the energies we are now beginning to study. It was, in fact, Enrico Fermi who earlier proposed a mechanism for cosmic acceleration of these objects. It is likely that there is no way to understand the origins of our universe from the first moments of explosive creation, without a more profound knowledge than we now have of the properties of the particles we will study in this laboratory.

I have on my list to tell you about other researches being done here and their connections with facts of our existence as humans on this planet. Let me illustrate this: What could be more abstract, more far out than the neutrino, a particle of no mass, no charge, of only weak force, proposed by Pauli in 1930, named by Enrico Fermi as a necessary ingredient in his still incisive theory of radioactivity presented to us so long ago.

The properties of neutrinos were greatly elucidated by years of experiments, culminating at Brookhaven, the tiny 30 billion volt ancestor of this machine. Armed with these facts, astrophysicists were able to understand the life cycle of the stars. Nature makes good use of neutrinos -- they are for carrying vast amounts of energy out of the hot stellar interiors -- they are for cooling. The ultimate clarifications are still to be made but recent results from this laboratory, following closely on reports from our colleagues at CERN, suggest a new property of neutrinos: the ability to collide with nuclei without producing any change in the internal state of the struck nucleus. This so-called neutral current force, if confirmed by presently on-going research here at NAL, may help explain one of the mysteries of our own environment: We know that elements are cooked in the sun -- but only light elements are cooked in our relatively young sun. How then do we account for the vast amounts of heavy nuclei on earth, for example, the iron that composes our magnets and constitutes a vital part of our own bodies? The fascinating possibility has been suggested that a fierce wind of energetic neutrinos, issuing from collapsing neutron stars may, via the agency of the neutral current force, drive out the inrushing heavy elements, themselves cooked in the last stages of the dying star. The dispersed heavy elements would then drift through space to where relatively young stars can warm planets now furnished with the variety of elements that make evolution of life possible. There are the connections of apparently remote phenomena that we find so exciting, so beautiful.

My list tells of many exciting activities in this young laboratory where the last monthly account lists 45 experiments representing 300 scientists and students from more than 80 institutions around the world.

In the relatively brief period of its operation much has already been learned.

We know now that anti-particles behave more and more like particles as their energy increases.

We have learned that the weak force continues to increase in strength as the energy is raised, a trend predicted by Fermi but which cannot continue indefinitely according to one of the most sacred of physical principles.

We have searched for quarks, the supposed basic constituent of all matter. So far, direct production has not been observed, although indirect evidence of the existence of quarks flits in and out of our experiments with a maddening elusiveness. So, experiments done here on the emission of energetic particles from the core of the proton suggest quarks whereas the recent detection of electrons and muons under similar conditions reminds us of a baffling result from the Stanford Linear Accelerator Center, our sister institution, where the quark theory triumphs in one section of the laboratory but suffers a fatal disease in another area. These are some of the exciting connections which we find so interesting.

We are here looking for all kinds of esoteric particles; for intermediate bosons, and monopoles, and new forms of electrons and muons, all motivated by the suggestions of a greater order and simplicity. To illustrate why new objects can result in simplicity, I could point out all the 100-odd chemical elements that can be built up from just three particles, the electron, proton, and neutron. But this great simplification couldn't possibly hold together if we lacked the discovery of just one of these three particles.

Much order has already emerged from the jungle of elementary particles and a new grand synthesis sometimes seems close and yet, here and there, in the corridors of this magnificent building and in its vastly improved cafeteria, one hears rumors of new data purporting to show that things are not what they're supposed to be.

It is on my list to say that this facility is nothing short of magnificent. Let me try to elucidate. A beam of protons of never before achieved intensity is extracted from the accelerator ring, and transported about 2 miles through a tortuous series of magnets which bend it, squeeze it, shrink it, peel off parts for experiments, and finally deliver it -- striking a target only a few thousandths of an inch across -- a marvel of engineering and organization.

I worked with neutrinos at Brookhaven where the first experiment in 1962 gave us one neutrino event per several days. At Brookhaven this has now been increased enormously, but here, thousands of reactions a day are observed with neutrino energies larger than 50 billion volts! Pion beams, beams of charged and neutral kaons, anti-proton beams, beams of particles of such short lifetime that the distance they cover, only inches in previous generations of accelerators, is now extended by both the relativity principle and higher energy to many yards, making incisive studies possible.

The list can go on, but it is appropriate here to recall the following historical facts. Every new accelerator, new in the energy domain covered, has yielded discoveries totally undreamed and unmentioned in the plans and in the designs. This machine with its unprecedented energy and intensity, its flexibility and diversity of ancillary facilities, cannot fail to maintain the tradition.

And we, the users, my colleagues and I, we will endeavor to do our share. We come together here under diverse conditions and from many places. We are graduate students -- Rabi calls them "poor beasts of burden" -- appearing now in very slowly increasing numbers after a bad period of concern with relevance and hopefully with a new recognition that these things too are relevant. We are professors also burdened with obligations of university citizenship, with teaching and with social concerns that make it essential for men of science to be involved. We are laboratory scientists, trying to squeeze in some of the research between long and arduous obligations to provide services to the academic community.

We are moved by this pause in our activities, this pause to contemplate what it is that is being given to us. This great machine and this beautiful laboratory. It is with awe and humility (the humility being probably temporary), that we add up our gratitudes to the various builders, to the science agencies of the government, to the wise men of our Congress, but also in no small measure to our Director, whose charisma and artistry and impudence and unflagging optimism have alternately driven us up the wall but also occasionally to some heights of pleasure.

In the annals of "I wish I had said that," no quotation looms larger for me than the following excerpt from one of the annual Congressional inquisitions that Laboratory Directors must suffer:

> Senator Pastore: "Is there anything connected with the hopes of this accelerator that in any way involves the security of the country?"
>
> Dr. Wilson: "No sir; I do not believe so."
>
> Senator Pastore: "Nothing at all?"
>
> Dr. Wilson: "Nothing at all."
>
> Senator Pastore: "It has no value in that respect?"
>
> Dr. Wilson: "It only has to do with the respect with which we regard one another, the dignity of men, our love of culture. It has to do with those things. It has to do with, are we good painters, good sculptors, great poets? I mean all the things that we really venerate and honor in our country and are patriotic about. It has nothing to do directly with defending our country except to help make it worth defending."

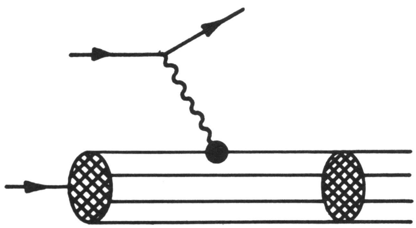
Robert Wilson and his long suffering but magnificent staff have responded to the challenge put forth years ago by Enrico Fermi -- whose voice you will now hear -- through the generosity of the American Institute of Physics Center for the History of Physics:

> Fellow physicists, in the twenty-year period since the foundation of the Institute, nuclear physics has been advancing perhaps as much as any other branch of our science. Twenty years ago, the neutron had not yet been discovered, the atomic nucleus was supposed to be or at least a favored hypothesis to the structure of the atomic nucleus, was that it consisted of protons and electrons. This very fact may give you some idea of the exponential progress of our rate of advance. Perhaps to give you another . . . to think of

another reference mark, think that 40 years ago was just about when the discovery of the nucleus was announced by Rutherford.

Like in all branches of our time there have been advances in very many directions. There have been advances in the techniques, there have been advances in the fundamental knowledge, usually not to be distinguished because the one determining the other. And just to go very briefly through the list of this kind of development, let me point out that over the period about which we are talking, the voltages achieved in the accelerating machines have been going up in steps roughly of 10 -- 10^6, 10^7, 10^8, and very soon, we hope, 10^9 electron volts. Of course the cosmos is still way ahead and is a good challenge for the constructors of high energy accelerating machines to try to overcome this rival.

This accelerator is an interim answer . . . This accelerator we're dedicating today, is an interim answer to the challenge laid down by Enrico Fermi in 1952. Thank you.



Laura Fermi, Mrs. Enrico Fermi, whose late husband was one of the greatest physicists of all time, has graciously agreed to say a few words. Mrs. Fermi.

As I was sitting back down-wind from the speakers up to a few minutes ago I missed what they said because with the wind and the waving of the flags I couldn't hear, so I don't know of the nice things that were said about this laboratory, but I subscribe to them all because I cannot think of any other place that has together as great a potential for science and so much esthetical value. I thought that I might say very briefly what Fermi's attitude toward accelerators was.

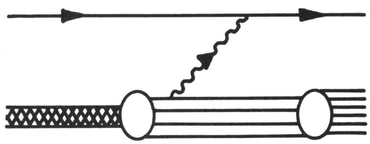
He was very happy when he could work with accelerators. He had his first chance right after we arrived in this country from Italy and news of the discovery of fission broke out. Fission was closely connected with his work in Rome, but to resume that work in New York he needed a source of neutrons. Through Herbert Anderson's good offices Fermi was able to use the cyclotron at Columbia University. To his great satisfaction he found that the cyclotron was a source of neutrons 100,000 times more intense than the radium-beryllium sources that he had used in Rome up to a few months before.

Fermi's excitement reached a higher point in 1951 when the Chicago synchrocyclotron was completed. To him this big machine was like a new toy, long awaited and exceeding expectations. He spent all working hours "playing" with it; and once, before the magnet was completely enclosed in its shield he showed me the tricks it could play, like snatching away a penknife from my hand and lifting up his jacket because he had keys in it. So when I saw it here, the old magnet was like an old friend.

At home Fermi talked of little else. Once he said: "Cyclotrons, like the pyramids of Egypt, may go down in history as examples of non-utilitarian monuments." It seemed a strange comparison, but Fermi explained that both the pyramids and the cyclotrons were tangible victories of men over the brute power of nature and both were built without consideration of financial return. The great Pyramid of Chios was built by 100,000 slaves who dragged huge boulders with ropes bound around their bare shoulders. Accelerators are built in a more civilized way, but they are no lesser feats.

In the early 1950's the Chicago synchrocyclotron was the most powerful accelerator in the world. The accelerator that you are dedicating today is 1000 times more powerful, and the whole laboratory is so vast that it can house the old Chicago cyclotron as just another piece of experimental apparatus. The National Accelerator is now the most powerful in the world and we may hope that it will remain so for a long time. But probably not forever.

In his retiring address as President of the American Physical Society, Fermi discussed future accelerators and predicted that as they would grow in power and size they would not be built on the earth but around it, and physics laboratories would be in outer space. At the time his remarks caused great bursts of laughter. But Fermi was a good prophet: in the early forties he belonged to a society of prophets at Columbia University, and earned the highest score for correct prophecies. Outer space laboratories are already a reality, and you may expect that at some future time accelerators will change the aspect of the earth and make it resemble the planet Saturn.



Our next speaker has been a member of the Atomic Energy Commission since 1972. Her first view of this laboratory was when the accelerator was just starting to operate and there was still a great deal of construction in progress. Since early 1973 she has been Chairman of the Atomic Energy Commission, and we are pleased and greatly honored to have her here today to dedicate and name this laboratory. Chairman Ray.

Thank you. Mr. Chairman, Dr. Wilson, Mrs. Fermi, distinguished Congressmen, members of the laboratory, and the hardy people of Illinois.

I am pleased to participate in this ceremony to dedicate a major addition to our nation's basic research capability.

Basic research, such as will be conducted at this accelerator laboratory, is essential to the long term well-being and technological development of our nation. In today's world, we all too often tend to judge programs in terms of their relevance to solving the immediate problems facing us. Although the solutions of today's problems are crucial, we must not forget that it is the long range basic research efforts which provide the new knowledge upon which future problems will be solved and future advances will be made. We know from past experience that future generations will derive great benefits from the results of basic research programs which achieve an effective balance between long-range basic research and directed shorter-range efforts needed to support particular energy missions.

I am proud that the AEC acts within the federal government as the executive agent for the nation's high energy physics program. Research in high energy physics may appear on the surface to be remote from today's immediate practical problems such as energy sources. However, this is the area in which the nature of matter and energy is probed most deeply. Thus, it is inconceivable that high energy physics will not yield new knowledge and fundamental insights leading to major, far reaching future advances in our control and use of energy and matter.

The pursuit of knowledge for its own sake has been the historic basis for some of mankind's most outstanding technical discoveries: the discovery of X-rays, radioactivity, artificial transmutation of the chemical elements, nuclear fission, fusion, superconductivity, penicillin, and the maser and laser. It is clear from these examples that we can better predict that basic knowledge will be used rather than predict how it will be used. It is pursuant to this tradition that we are all here today.

The facilities of this vast new laboratory will provide researchers with powerful new tools to explore more deeply the inner recesses of matter and energy.

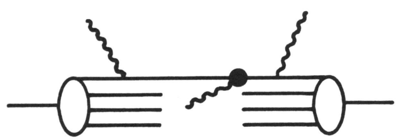
In addition to its scientific and technological characteristics, high energy physics has provided a valuable meeting ground for international collaboration at NAL; in addition to collaboration with Canada and Western European countries, there has also been a successful collaboration with the USSR. In fact, one of the earliest experiments at NAL on proton-proton scattering was carried out by a joint US-USSR research team. We can continue to expect this laboratory to serve a worldwide community of scientists.

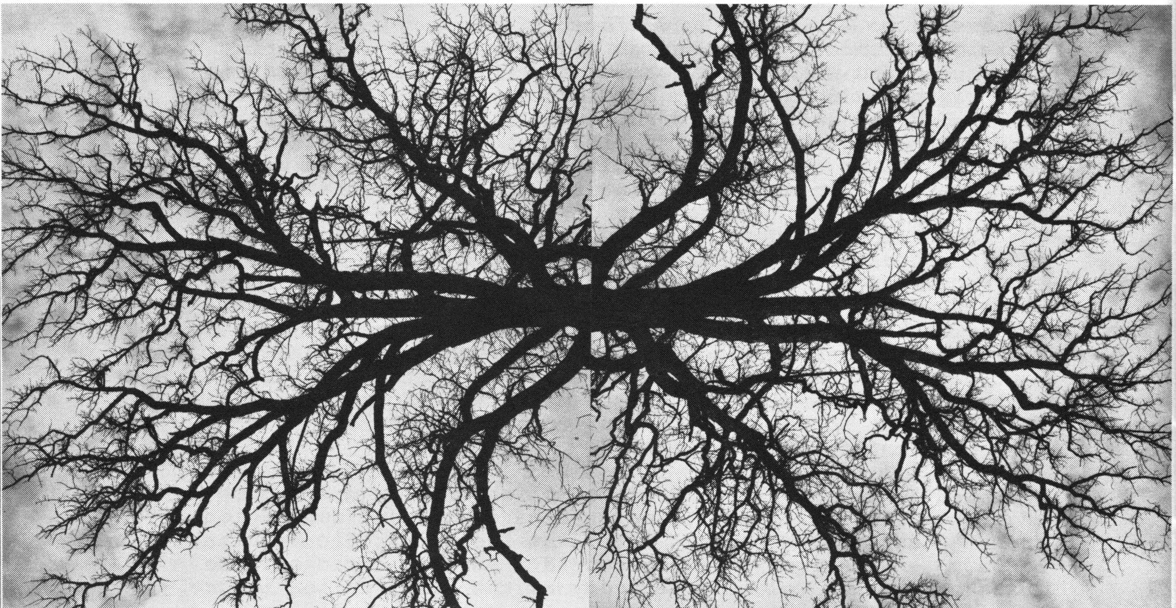
The primary purpose of the ceremony today is to dedicate this facility to the memory of the late Professor Enrico Fermi, who was one of the great pioneers in the development of nuclear science. One of the important problems that commanded Professor Fermi's attention in those early years was the puzzle of nuclear beta decay and that there might be a previously unknown neutral particle taking part in the process. Professor Fermi was able to work out the details, with a suggestion by W. Pauli, to show that there was indeed a new neutral particle present -- which he labeled the neutrino or "little neutral one." This study of neutrinos has been carried to higher and higher energies and the Fermi theory of weak interactions is today well established as one of the cornerstones of nuclear science. The study of neutrinos at very high energy is one of the major experimental thrusts of this laboratory today, thus continuing a line of investigation whose roots trace back some three decades. Later, Professor Fermi led the first demonstration of a uranium fission reactor at Stagg Field. He also played a key role in the Los Alamos project. Thus, Professor Fermi played a major role, both in the early experimental and theoretical development as well as the application of basic nuclear science, which was the elementary particle physics of that time. It is most fitting that this facility, which will carry us further on our journey inside the nucleus, should be dedicated to the memory of one of the earliest nuclear pioneers.

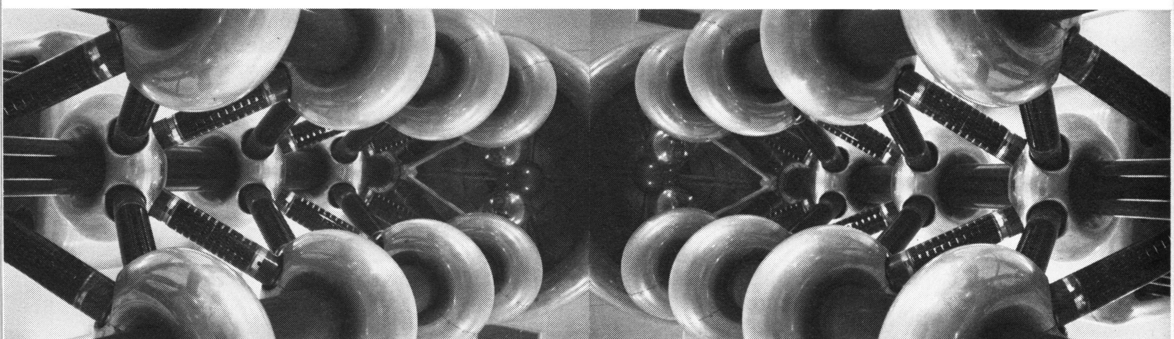
Let me at this moment recognize Congressman Annunzio of the 11th District of the State of Illinois, who was the very first of a large number of the members of Congress to introduce resolutions to name the laboratory in honor of Professor Fermi.

I must express the admiration and appreciation of the Commission to Dr. Wilson and his staff for a job well done on this tremendous new research facility, built on a rapid time scale and within a tight budget estimate. What started out originally as a 200-GeV accelerator now operates routinely at 300 GeV and has operated successfully at 400 GeV. It is already the highest intensity high energy accelerator currently operating. The selection of this site was surrounded with controversy. The state legislature had just rejected a proposed open occupancy law, and to many of the residents of this area the selection of a DuPage County site suggested governmental indifference to the need for fair play and equity in social and racial matters. Happily, the AEC and its then Chairman, Glenn Seaborg, and the Laboratory Director, Bob Wilson, saw the selection as an opportunity to show what could be done to give all citizens, regardless of race or color, a chance to participate in the building and operation of the new scientific venture symbolizing our effort to make this project a response to the urgent social needs of our country and to our need to pursue scientific knowledge.

The achievement of these accomplishments required much ingenuity and creativity as well as hard work and dedication from the entire laboratory staff. As the scientific results begin to emerge from this, the world's largest basic science instrument which we dedicate today as the Fermi National Accelerator Laboratory, we enter into a new era of scientific achievement for the greater understanding and the improvement of life for all mankind.







Robert Wilson, as you know, is Director of this laboratory. As you look around today, you will find many evidences of his imagination and innovation. There are many more in the accelerator itself. Today, at the dedication of this laboratory, I wish to congratulate him and all the members of this laboratory for the very fine job they have done. The Trustees of URA are very pleased that within the past few months he has accepted an additional five-year appointment as Director. Bob Wilson.

I speak for my colleagues who have built this laboratory. We are deeply honored to have the name of Fermi attached to our laboratory. Laura, I pledge in their name that we will do our best to make this a laboratory worthy of the name of Enrico Fermi. We thank all of you who have come so far for this occasion.

Before concluding today, I would like once again to give my congratulations on behalf of the URA Board of Trustees and the member universities to Robert Wilson and his staff for their fine accomplishment. Many times they have been severely understaffed and they have worked long hours. Today a milestone has been reached.

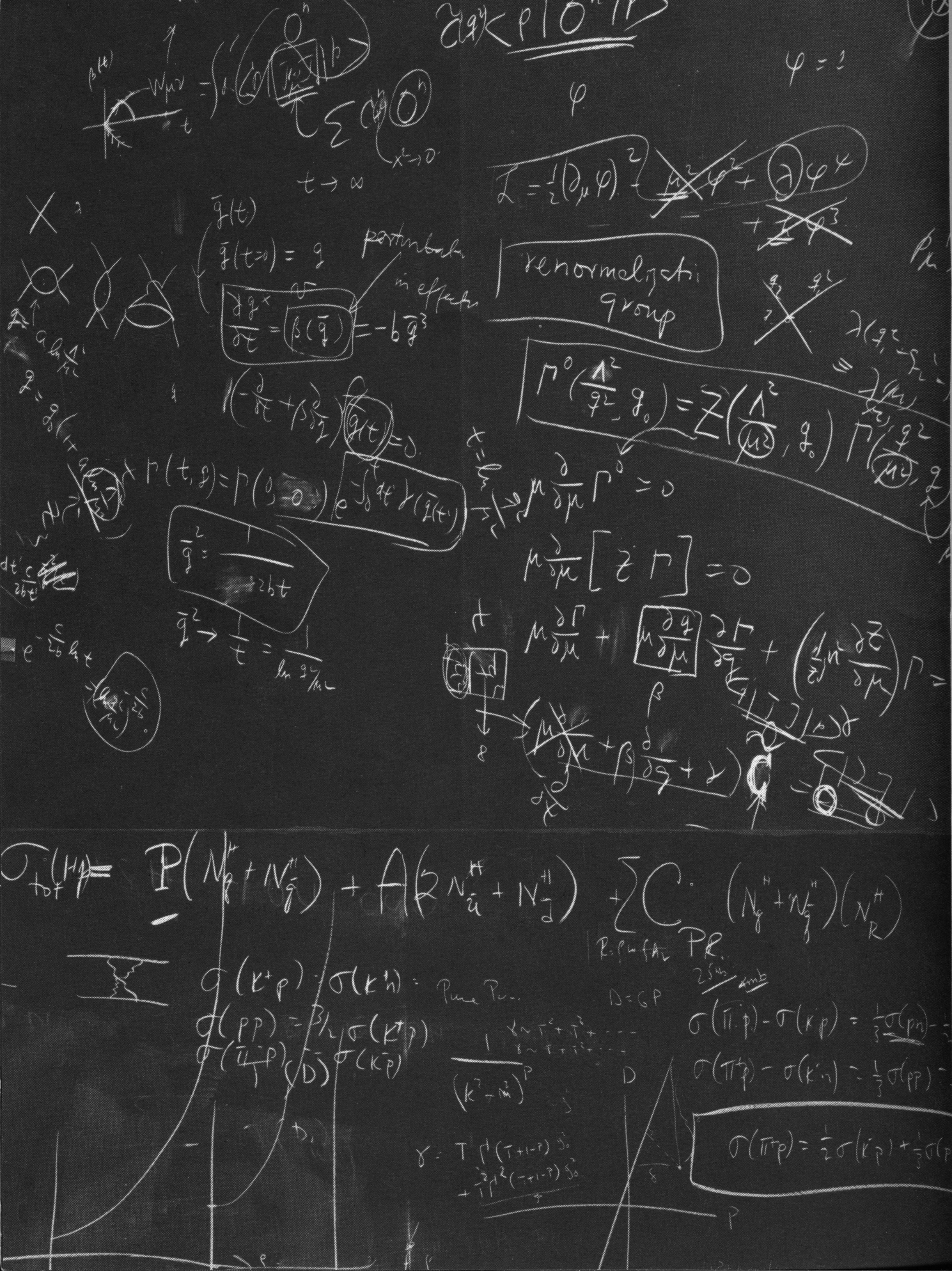
From noon today to now the accelerator has been in standby condition. This laboratory is on a 24-hour day schedule, seven days a week and operations are scheduled to resume at 6:00 p.m. today. If Enrico Fermi were here at this moment, he would encourage the laboratory members to get going again, and so we now conclude.

CREDITS

All the photographs were taken on the Laboratory site. Except as noted, they were all taken by Fermilab photographers.

Cover	Enrico Fermi (courtesy of D. Anderson, University of Chicago)
Inside front cover	Aerial view of Fermilab site, taken in August 1973 (photo by Sidwell Studio, Inc., West Chicago)
ii	Central Laboratory Building
iii	Condenser bank for the neutrino horn
viii	Aerial view of Fermilab, taken in October 1973
2	The speakers' podium. L-R, Mr. Erlewine, Mr. Lederman, Chairman Ray, Representative Hosmer, Mr. Ramsey, Representative Price, Mrs. Fermi, Senator Percy, Mr. Norman, Representative Holifield, Mr. Wilson, Representative Annunzio (obscured), Mr. Stever, Mr. Tape (partially obscured), Mr. Teem
3	Mr. Bacher
7	Mr. Stever
8	Senator Percy, Mr. Wilson, Mr. Strauss viewing magnet coils during the tour of the accelerator
9	Senator Percy
12	Contact print sheet, Dedication Day photographs
13	Mr. Price
16	Some guests touring the Meson Detector Building
17	Mr. Lederman
26	Mr. Bacher, Mrs. Fermi, Mr. Norman
27	Mrs. Fermi
29	A member of the Fermilab buffalo herd
30	Mr. Hosmer, Mr. Ramsey holding Chairman Ray's dog Jacques, Mr. Price
31	Chairman Ray
34	Upper montage, trees. Lower montage, high voltage components of the Cockcroft-Walton pre-accelerator
35	Mr. Wilson
37	The Central Laboratory Building (photo by P. Zimmerman)
38	Interior of the Main Accelerator tunnel
39	Forest (photo by A. R. Donaldson)
40	Particle tracks in the 30-inch hydrogen bubble chamber
41	Squirrel-tail grass (photo by A. R. Donaldson)
42	Blackboard, Theoretical Physics Department
43	Snow montage (photo by A. R. Donaldson)
Inside back cover	Cracked mud (photo by A. R. Donaldson)

Book design and layout by Angela Gonzales.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