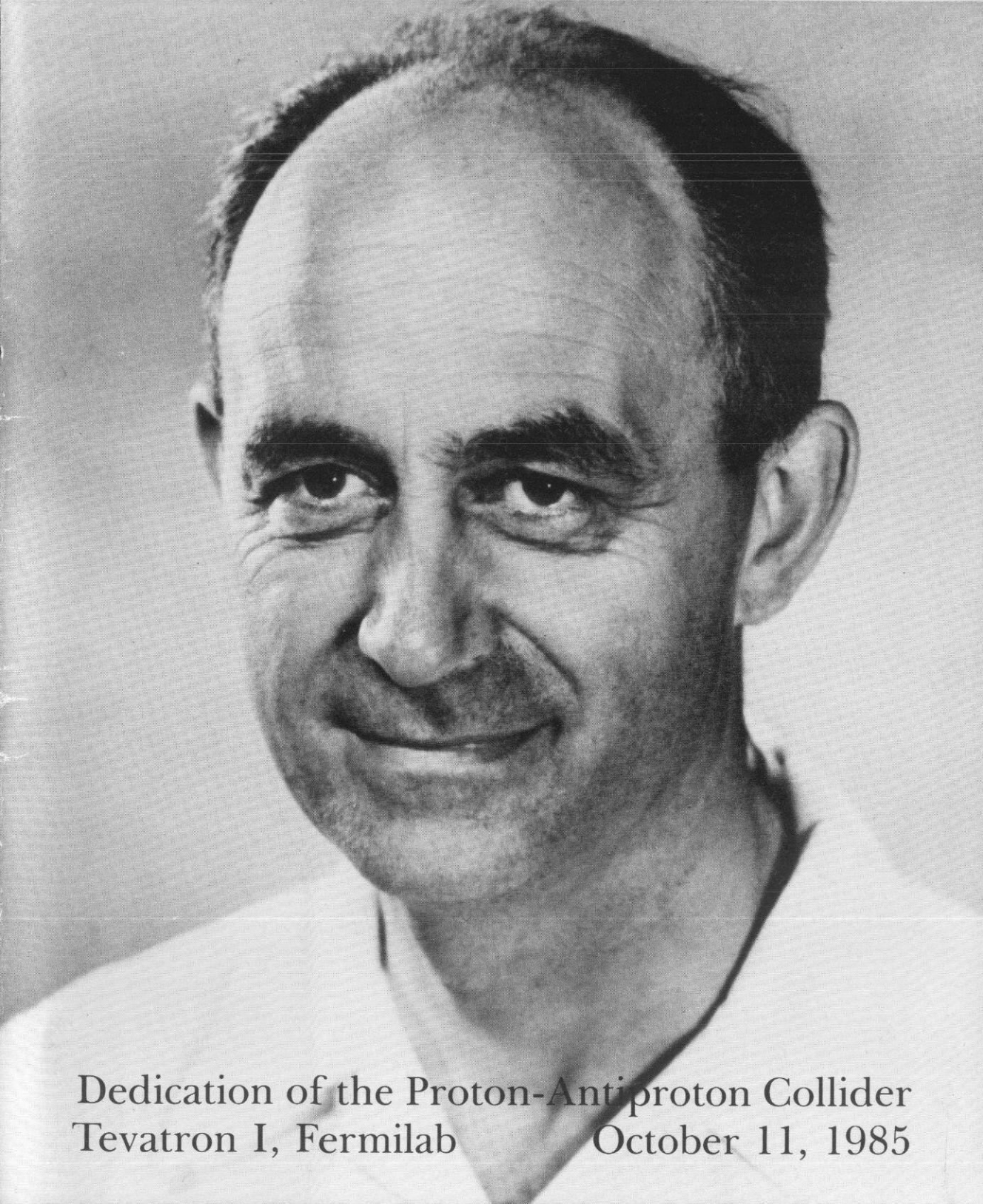
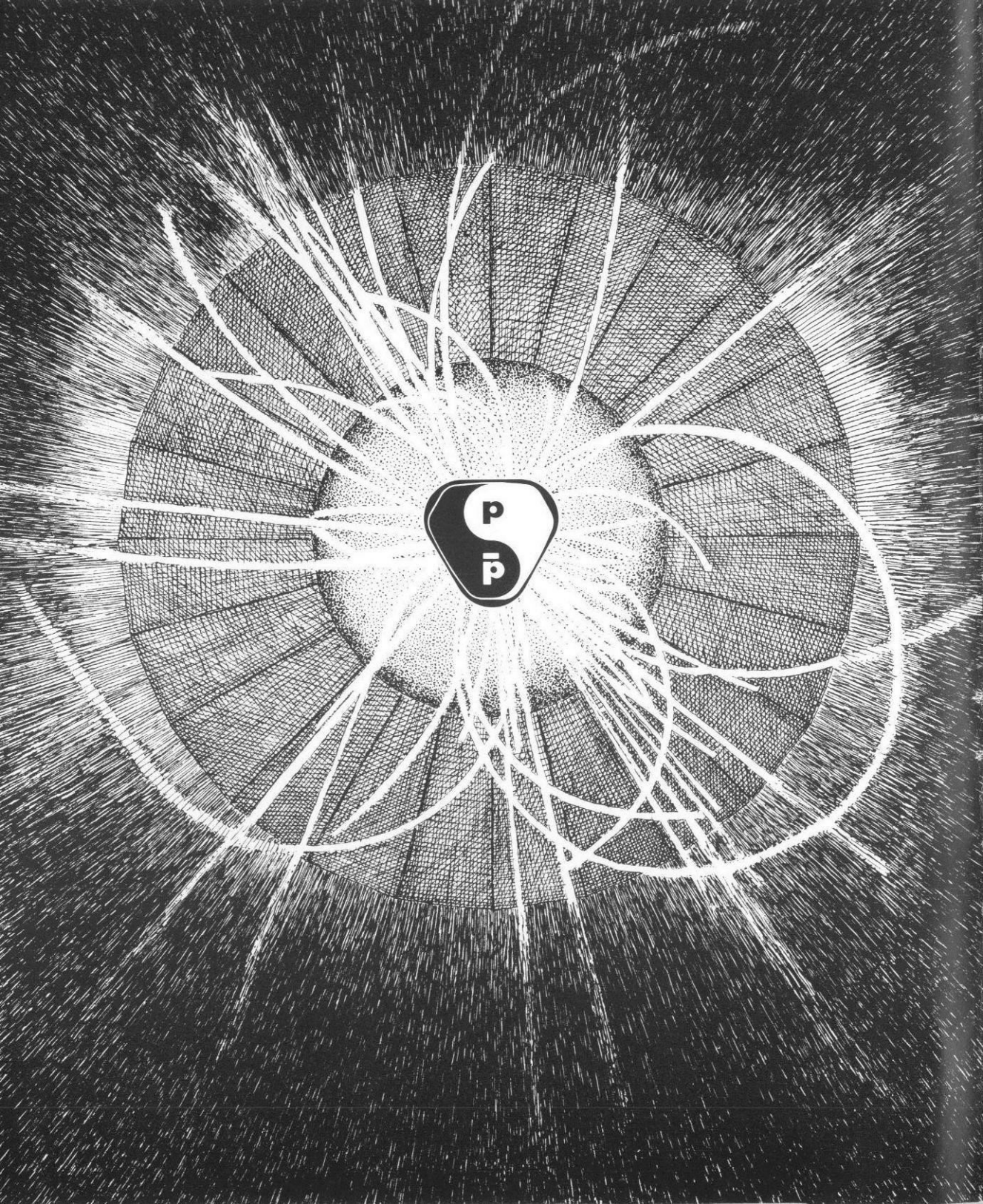


Dedication of the Proton-Antiproton Collider
Tevatron I, Fermilab October 11, 1985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Dedication of the Proton-Antiproton Collider Tevatron I, Fermilab

October 11, 1985

Fermi National Accelerator Laboratory
Batavia, Illinois

Operated by Universities Research Association Inc.
Under Contract with the United States Department of Energy

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Dr. Harry Woolf

Director, Institute for Advanced Study
Chairman of the Board, Universities Research Association, Inc.

As an educator, I would like to condense the urge for improvement and brevity in one short story before we turn to the formal program. And this concerns a school for twelve-year-old girls in Britain some time ago, where the teacher was concerned that the children were not learning to write well and to write briefly. So she invited a distinguished writer to come and speak to them, give them the essence of what good writing was about, good performance could be. And he gave a rather longish talk, but closed it by urging that they, when they write, always embrace four important things: God, aristocracy, sex, and mystery. And with that, he left the room.

The teacher thought this was a wonderful formula for an assignment, and she immediately said to the students, "Take that home and by tomorrow morning bring back the shortest story you can write involving the four principles."

Just as she was about to dismiss the class, one little girl raised her hand, said, "I finished."

Teacher said, "What?"

"I've completed the assignment."

"Well, I just gave it to you."

"Well, you did say 'The shortest story possible.'"

"Yes."

"I've done it."

"Then please read it to the class."

So she stood up and said, "'God,' said the Duchess, 'I'm pregnant, and I don't know who did it.'"

That's meant to be a model of what is to follow for the rest of the afternoon.

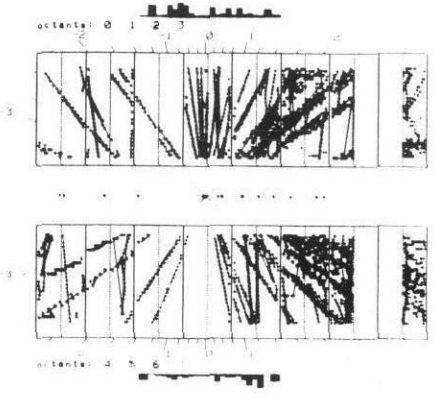
In the great tradition of science we have come together to dedicate a new instrument for the advancement of learning. In the history of science, its daily progress has always assumed, consciously or not, a reductionist point of view. That is, that we can best understand nature's operations by a constant reduction in scale: mass divided down to its smallest parts, energies down to their smallest viable units.

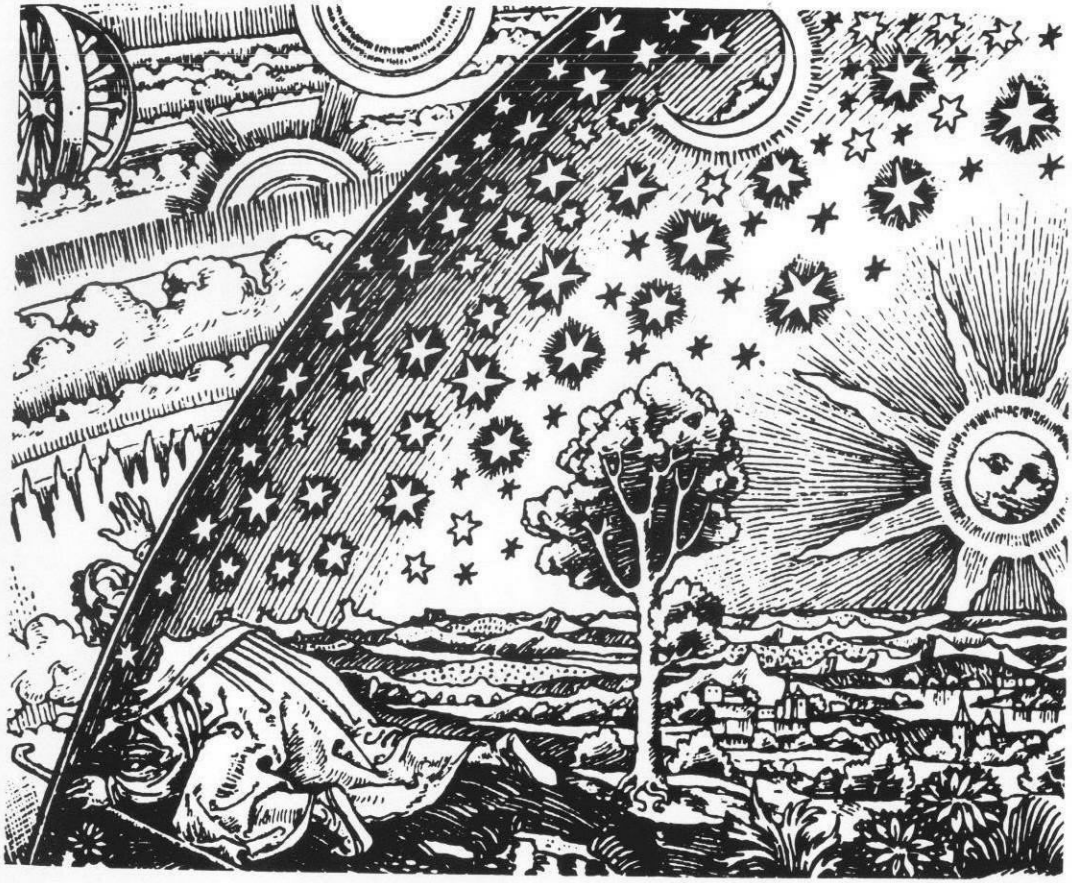
As we search for the invariant factors, the unchanging in a world of change, from time to time a synthesis of these disparate items into a coherent theory gives us a paradigm of explanation and discussion and, equally important, some modest psychological comfort that we belong to and understand the Universe we inhabit.

But whether we believe that we discover the world or invent it, or perhaps both, our varied philosophical positions assume in common that there is a real world out there, that it can be understood for itself (and this audience here, today, knows that pain and that joy of the endeavor), and that that understanding can be used, in Francis Bacon's phrase, for the relief of man's estate. Science creating knowledge, and knowledge made useful.

Thus, as a people freer than most in the history of humanity, we have come to appreciate that the pursuit of learning is not merely the fringe benefit of a materially successful society, but a major defining element of its culture, a large part of its reason for being. To build machines of higher and higher energies, of greater and more beautiful geometries; to penetrate, with finer and finer probing fingers, the inner structure, the quintessence of things, is as compelling a component of our natural being as the urge to paint, to compose, or to condense our wisdom and our feelings into the concentrated language of poetry.

We are what we do, perhaps more than what we say. And this celebratory occasion is both an expression of our pride in the construction of the Collider, as well as our thanks to all who have brought it about. And perhaps no other single person here, the one who needs least to be introduced, deserves that thanks than Leon Lederman, whom I now present.





Dr. Leon M. Lederman
Director, Fermi National Accelerator Laboratory

In the study of particles of nature and the study of the forces in which they engage we've learned how to learn from collisions. The more violent the collisions, the more incisive the measurements. Past years have witnessed an increasing mastery of the collider mode, in which particles moving with very high energies in opposite directions engage in head-on collisions which are vastly more violent then the conventional impacts of accelerated particles with fixed targets.

One can compare this to the collision of a fast-moving truck and a ping-pong ball. In most cases, neither the truck nor the ping-pong ball are very seriously injured. But if you have two fast-moving trucks in opposite directions, you can imagine the violent emission of fenders, and bumpers, and radios, and light bulbs, and so on.

Fermilab's collider brings the art of the accelerator builder to a new pinnacle of technological achievement, and in so doing, brings to the scientific community a magnificent new tool for the advancement of knowledge.

The story of the collider involves a complex choreography of rings. Two new rings, three old rings; a blend of engineering precision and power representing untold hours of creative efforts by several hundred scientists, students, and engineers working in three intimately coupled domains: the Antiproton Source, the existing accelerator complex, and the particle detectors. This ensemble of efforts, a prodigious investment of talent and resources, will address a large number of definable questions and will have the capability of exploring a domain where the right questions might not even have been asked.

There is little doubt that the Tevatron collider will advance the subject of particle science substantially. History guides us to the high probability that society will eventually have direct benefits from this research.

What I'd like to do now is to introduce to you some of the leaders who sit very uncomfortably on the stage representing their groups and the people that they feel really did the work. But, nevertheless, I think it is their burden to be introduced. I would like to introduce John Peoples and Don Young, the head and the associate head of the Tevatron I project. The next component is the Accelerator Division where the head of the Accelerator Division is Rich Orr and the deputy head is Helen Edwards. Representing the Colliding Detector Group, I'd like to

introduce the co-leaders, Roy Schwitters of Harvard, and Alvin Tollestrup of Fermilab.

A lot of this work depended on the Laboratory infrastructure, lots of infrastructure, and to represent that infrastructure, I'd like to introduce the people who established and now direct Technical Services, Richard Lundy and Paul Mantsch.

I'd also like to acknowledge the collaborations we have had with other institutions and especially with the Lawrence Berkeley Laboratory, Argonne Laboratory, and the Institute for Nuclear Science in Novosibirsk. They have been splendid collaborators.

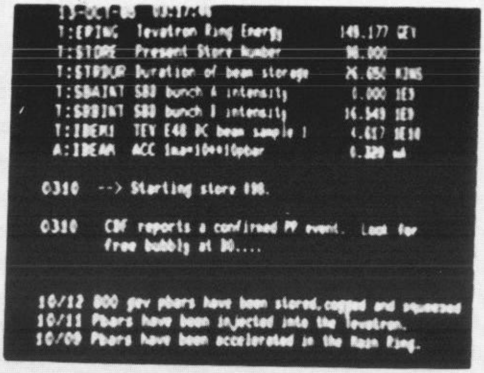
The Tevatron, in the next years, will take its proud place as one component in a science enterprise that pervades and provides muscle and music to our national life. Thank you.

OCT 13 1985 Sun

Your CDF Crew

David F. Connor, Penn

Tony Liss for the PIGS



Bob Wagner) ANL
Yasuo Fukui) KEK
Larry Nodulman ANL

Rick St Denis. Harvard.

Marjorie Shapiro

Frederick D. Snider

Maria Curatolo

L. Bertolucci

Bill Foster

Andrew Beretvas

Maria Binkley

Dimitrios A. Dimitroyannis

Giorgio Chiarelli

Rockefeller U/INFN PISA

Christopher T. Day

Steve Kuhlmann

近藤都登

滝川紘治

Lee Holloway

Mel Shochet

Shoji Mikamo

Kyoshi Yasuoka

Barb Pennington

Steve Holmes

Alvin Tollestrup

Recd from WJW #1 ALT

Carl Haber

Daniel A. Johnson

Maki Sekiguchi (Happy birth day)

Masa Shibata

Margaret Pearson

Dave Kephart

R. Vidal!

Hy Frisch

Rob Johnson

James Bradford

Roy F. Schwitters

Tony Carroll

David A. Smith

内泰

山下明元

Leon Ledman

JOHN COOPER WAS HERE IN SPIRIT IF NOT IN PERSON.

J.W. Cooper

Steve Hahn

掃部輝樹

Ed Hahn

(chick a lytle)

Helen Edwards

Mauro Dell'Orso

Jim Freeman

John Peoples

Mark

John E. Elias

Hans B. Jensen

Catherine Newman Holmes (+ Stephanie Carlie Holmes)

Paolo Giannetti

Dr. Lewis M. Branscomb
Vice President for Research, IBM

Secretary Herrington, Governor Thompson, Dr. Lederman, ladies and gentlemen.

Dedications of major new research facilities are always welcome occasions - chances to say "thank you" to their supporters (in this case, the Department of Energy); to say "congratulations" to the leadership and staff of a great laboratory; to say "Godspeed" to the many scientists eager to use this fine new facility to expand our knowledge of matter, forces, and the Universe.

But **this** dedication is different from the usual ribbon-cutting for a fine facility full of hope and promise. With the Tevatron in full swing, 24 hours a day, its immense power responding to the incredibly delicate and precise control of some of the world's most talented scientists, we visitors can feel the extraordinary excitement of this grand adventure.

Probing the innermost secrets of the physical world - and from them developing a detailed picture of how our universe began in its first seconds, minutes, and hours - is, along with the exploration of the origins of life, the intellectual "Everest" of our time. We climb that mental mountain not just because "it is there"; we climb it because we must. Not to do so is unworthy of the talent given to us by our Creator.

I can't help but recall the time that Robert Wilson, this Laboratory's founder and first director, appeared before a Senate committee on appropriations to request several hundred million dollars for some construction. Senator Pastore kept pressing Dr. Wilson to say there was something of military significance for America in the project. To which Dr. Wilson replied, "No, Mr. Pastore. In all honesty, this project has absolutely nothing to do with the defense of the United States. But it could help make the United States worth defending."

Today, here at Fermilab, we are not looking at that Mount Everest from afar, awed by its massive scale and threatening demeanor. We have been placed on a ledge at 29,000 feet, watching a few of our fellow humans who possess the gift, the zeal, and the commitment, reach their hands over the ledges that lie between us and the summit of human knowledge about the world we inhabit. What a wonderful time to be alive, and what a wonderful place to be on this day!

Particle accelerators have come a long way since the little breadbox-sized cyclotron that E. O. Lawrence built in 1930 at the University of California. By the late 1940's, many cyclotrons were being built at a cost of around $1 for each electron volt of energy. Today, for the $137 million that I understand it took to transform Fermilab's fixed-target proton synchrotron into the world's highest-energy colliding beam machine, we soon expect to see two-thousand million volts of energy creating new matter in the collision of protons on antiprotons.

I calculate that that's a cost/performance improvement of 1.5 million percent in 40 years. That 27 percent per year is pretty impressive; it is as good a record as the computer industry, which has, as far as I know, the best industrial track record for sustained productivity improvement.

Now, I'll admit that many Americans don't relate to such big numbers, even when they describe spectacular achievements. Sometimes we scientists lose heart and despair that our fellow citizens will continue their extraordinary record of faith in sharing our dreams.

One evening in 1954, I was dining at Harvard with one of our nation's leading high-energy physicists. At that time, accelerators had reached the range of a hundred million electron volts, and the new discoveries in physics were as frequent, and as exciting, as ever before. But my friend despaired of further progress in this field of science he so deeply loved, because he felt the American people would never be willing to invest the money needed to build even bigger machines for producing phenomena unknown to human beings, simply to permit their investigation. How he underrated American faith in science, pride in leadership, dedication to excellence!

But we Americans are practical and frugal people, for all our altruism. And those from whom an act of faith is asked have the right and I think, perhaps, the obligation to ask us the hard questions - to try to understand what we scientists are about.

To underscore that, I'd like to share with you the views of a scientist who has worked for 14 years in a commerical enterprise. In the next few minutes, I want to convince you that the only effective strategy for ensuring technical excellence in America is to stretch as far as we can into the unknown, stretching all our technological capabilities to the limit in the process. When we choose as targets of this scientific and technological muscle-building the investigation of seemingly abstract and very fundamental questions, it is because these goals provide the most strenuous tests and bring out the most powerful motivations.

I don't mean to imply that fundamental scientific knowledge is not of enormous intrinsic value. All good science can be very useful and provides mankind with a lot of choices that we would otherwise not have.

Microelectronics for computers and the technologies for recombinant DNA were not contained, even implicitly, in the engineering handbooks of their day, nor were they tripped over "by accident" in some laboratory. Indeed, it is hard to think of any technology important to our economic competitiveness or our standard of living that has not been bolstered, directly or indirectly, by exploratory research into fundamental aspects of matter and energy.

We can catalog a number of practical, immediate benefits that have real value from a project like the Tevatron:

- New ideas and technology in cryogenics, computing, and electrical engineering.

- Challenges for the vendor industries that support Fermilab.

- And, most of all, an exceptional educational experience for hundreds of young scientists, who will find their way into our universities, companies, and government laboratories. After this experience, they will never be satisfied with second best, with compromised goals or easy work.

What applies to those students applies to our nation as a whole and explains the most important reason for supporting scientific laboratories like Fermilab.

No one on either side of the political aisle seriously questions the federal government's primary responsibility for the nation's scientific vitality, through the support of fundamental research. The tough question is: How should the government select goals and projects to assure the greatest value to the American people from its investment in basic research?

I submit that government might well take a leaf from the book of experience in America's leading high-tech companies.We in industry are **also** interested in early results of practical value from our corporate research. And managers in industry **do** keep asking the scientists, "What have you done for us lately?" But it may surprise some of you to know that we do not attempt to apply a microeconomic test to fundamental research project proposals. Instead, we ask four questions:

- Will the project explore the limits of what nature permits anyone to achieve, and will it provide us a road map to the future?

- Is the field of research one of interest and promise, touching on the basic issues governing our technical progress?

- Will the project give us a window on the scientific world outside our institution, and let us understand, in-depth and quickly, the achievements of others?

- And will the project attract the brightest young scientists and engineers to the enterprise, bringing pride and honor to our laboratory and a sense of great achievement to our people? Will it engender in them the confidence to accept equally risky commitments when the company needs to launch a very ambitious but more applied project of near-term industrial importance?

Even though companies like IBM can sponsor only a small fraction of the nation's basic research, we too have our Tevatron-like projects, aimed at giving a few of our research people the opportunity to stretch the art of the possible to the absolute limit.

Take, for example, a massively-parallel experimental computer called the GF-11, now under construction at IBM's Watson Research Center. The GF-11 is anything but a general-purpose machine, having been designed primarily for quantum chromodynamics calculations which tend to be rather lengthy. A typical QCD mass calculation on a super-minicomputer might take 30,000 years and, even on a Cray-1 supercomputer, 100 years. But our people are hoping that the GF-11's 576 single-chip processors should be able to complete the same calculation in a mere single year of night and day computing.

IBM does projects like the GF-11 to advance our knowledge of parallel processing, true, but also because doing them motivates our scientists and everyone else in the field to reach beyond where they thought they could reach. The Department of Energy and Fermilab play that kind of role for the whole nation, indeed the world, in high-energy physics and its related technologies, setting a standard for what constitutes scientific excellence and, indeed, excellence in engineering and in project management.

Industry is not likely to copy the work done here, because after all, these are very exotic projects; no one does anything like this in industry. But the whole U.S. technical community is

aware of the extraordinary sophistication of what goes on in places like Fermilab and, importantly, how well it is executed.

Fermilab challenges everybody else to stretch beyond what might otherwise have been accepted as adequate performance. Just as the chief executive of a company should never be satisfied with good work if his scientists are not doing the best they possibly could do, so too our government should not be satisfied unless the advanced, fundamental research it is responsible for sets that same kind of standard. **That** is why this country has to commit itself to the most daring and rewarding of scientific goals. Obviously we can't do them all, and it may be true, as some believe, that the U.S. cannot afford to be best in every field of science.

When NASA decided we couldn't afford a satellite to fly through Halley's Comet, our space scientists drew on hidden resources of ingenuity to find an alternative that kept us in the competition. They invented the incredibly precise multiple-slingshot mission around the moon to reach the comet Giacobini-Zinner - a target only a few thousand miles across and 45 million miles away.

In similar style, Fermilab found a way to stay ahead with the Energy Saver, doubling Tevatron's energy while saving two-thirds of its electrical power.

Certainly, we cannot **expect** always to be best in every field, for that depends on whether our scientists are brighter, more imaginative and, perhaps, luckier than their colleagues in other nations in each field. But American scientists clearly deserve at least the **opportunity** to lead, to have the most exciting and successful research ventures in every one of the major fields of science. And when we are successful, every other scientific venture is inspired anew to higher achievement.

I congratulate the Fermilab staff and their colleagues for the hard and smart work behind today's dedication. I also congratulate the Department of Energy on the extraordinary contributions that DOE and its predecessor agencies (going back to the Atomic Energy Commission) have made to American science and technology.

I hope, Mr. Secretary, that this achievement inspires us all in government, industry, universities, and national laboratories to redouble our commitment to reaching up to each new ledge of scientific discovery. We will never reach the summit of that mountain of knowledge, but the climb will make our bodies strong and, by keeping our eyes looking up instead of down, will prepare us for whatever challenges lie ahead. Thank you.

Dr. Norman Hackerman
President Emeritus, Rice University

Mr. Secretary, Mr. Governor, ladies and gentlemen, I certainly appreciate being here, and in fact, I consider it a great privilege to be in this distinguished company here on this stage and in this auditorium.

I've been at the opening of quite a number of major science facilities and I'm impressed in every case not only by the excitement that they generate, but by the inevitable important results that they produce. As far as I know, we have never been disappointed in the action which comes from providing these major facilities for science.

Science stems from the word "scientia," and I'm sure most of you know it is Latin for knowledge. So science is a dynamic of improving our understanding of nature. This instrument that we are talking about today is obviously going to be an important part of the armament.

The reason for support of a facility with pooled funds, with tax money, cannot be for cultural reasons alone. Dr. Branscomb alluded to that. Support of that kind, the money that is given by all of us for common and important use, has to have a basis which is, in this case, the ultimate use of science.

Ultimate use of science doesn't really intrigue some of my colleagues in science, but the fact is that that is really why the country should unstintingly help the system. Let me tell you why I think that is so. Let me develop for you a simple equation: innovation is equal to an idea plus its development plus the translation of the developed idea into technology plus the multi-step requirement to convert it to use. That says that technology is pulled by use but fueled by science. The latter involves the idea and its development.

The fact of the matter is, science is not the same as technology, as many people believe. Science is not sufficient alone in providing for technology, but science is a necessary prerequisite to technology. You can ask, "What is so important about technology?" Well, with a world that has almost 5 billion people on it, and more coming, it is impossible for the planet to support that population without technology. It is a requisite for food, for shelter, for health. In a more chauvinistic vein, from a national point of view it is necessary for economic health and military security.

That technology is vital and cannot reasonably be questioned. Given this requirement, there is no doubt about the importance of science, first to technology and then to use.

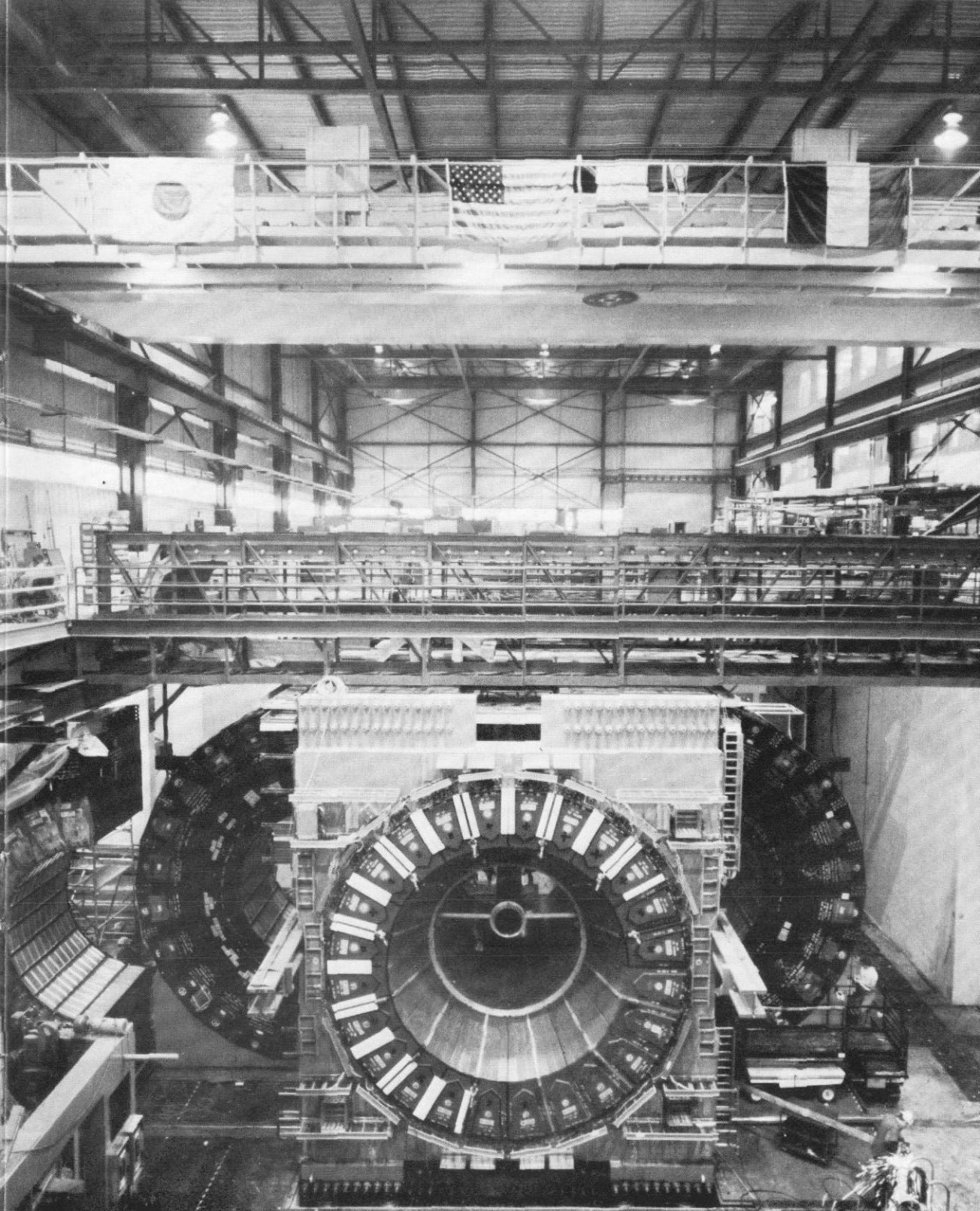
Arguments have been made that that assertion really cannot be proved. It is true that it is hard to show the direct conversion, or direct attachment between science (for example, this esoteric system that is the reason for this celebration) and ultimate use. While that is basically true, some can be. For instance, Dr. Branscomb mentioned microelectronics; but in fact the collider is clearly important to the great field of science; indeed, science feeds on itself.

I'll try to develop this quickly. There are a few great transitional ideas that appear per century, and there are then many, many good ideas which develop those great transitional ideas. Then there are a multitude of more pedestrian ideas and activities which bring the whole system to fruition. Science has suffered because it's compartmentalized because few, if any, of us are sufficiently capable of encompassing all we know about nature. It is interesting that the divergence of science into its various fields, which probably began about the time of Newton, has now changed to convergence. The convergence in the field of science is very evident, the blurring of the boundaries is very evident, and I would say that a great part of that blurring comes about because of the highly sophisticated instrumentation of the last several decades.

That instrumentation (exquisitely inquisitive sensors), has made it possible to do exceptional experiments and the exceptional experiments have unblocked lines of theory long dormant. The last 20 or 30 years, all of these have sprung alive almost simultaneously. The fact is that we are moving at a very rapid rate in our understanding of nature. I would be more worried that we get to know too much too soon, except that I assume that our stockpile of ignorance is infinite and we therefore have no reason for concern.

In any event, the opening of a new science facility means new experiments, which means new theory, and this new experiment if so on and so on, this means new technology, which means new use, and this means the attainment of a still more advanced stage of culture and civilization.

Therefore, it seems to me, Dr. Lederman, that there is just and proper cause for great celebration at the opening of this Proton-Antiproton Collider, an instrument of the kind I have been describing. Thank you.



Governor James R. Thompson
Governor, State of Illinois

Mr. Secretary, Mr. Director, friends of Fermilab, I come here this afternoon, not so much to speak to 1 trillion volts in the Fox River Valley, nor the possibility of 3 trillion votes in the Soviet Union, nor to the ultimate possibility of 20 trillion here in the Fox River Valley, but to speak, rather, of a subject which is increasingly important in the economic, scientific, and cultural life of Illinois and America. That is a subject of partnerships - how we all got here, and where we need to go together.

This has been, in many ways, an extraordinary year for the people of Illinois. This last week has been a most extraordinary week for the people of Illinois. This last year and this last week illustrate, I believe, the value of the partnerships that are being forged on the prairies of this great state.

When the legislature adjourned in early July, it had done two remarkable things. First, it had forged an unprecedented coalition to bring reform to elementary and secondary education in this state. In the words of the Education Commission of the State, "...to go to the head of the class." And it had supported that reform with unprecedented funding.

That was for the little kids. On the side of the big kids, as we affectionately divide education in Springfield, we had further strengthened the imperative linkage between the development of science and technology in our classrooms and laboratories of Illinois' great universities and colleges, and had rededicated ourselves to transferring that technology to the marketplace of Illinois, the United States, and the world.

This will create economic opportunity for our people. And we rewarded that increasing linkage between higher education and the marketplace with extraordinary funding.

We embarked upon the most ambitious program of building and rebuilding Illinois that this state has seen since its founding in 1818, through the Build Illinois Program. In other words, eleven and one-half million people had made the conscious decision through their elected representatives to invest in themselves for the present and for the future.

I haven't heard a word about rust belt or sun belt all summer long. The despair of the past and all the hand wringing which accompanied it in the business, labor, and political worlds, seems to have greatly diminished. We have recovered a

great deal of our pride, as well we should, in reflecting upon the extraordinary resources that we possess in this great state. Resources of people, as well as natural resources. We have recovered a great deal of our ambition - the kind of ambition which forged a strong, powerful state from the prairie, which is recreated just outside these doors.

That kind of determination by the people of Illinois, expressed in common form across our state, has made this last week a most extraordinary week in the life of our state. On Saturday, on the campus of the University of Illinois at Champaign-Urbana, I was pleased to participate in the announcement of the single largest gift ever given by an individual American to a public institution in the history of the United States. Dr. Arnold Beckman of California, a native of Illinois who graduated from the University of Illinois in 1922, never forgot a debt he thought he owed. Dr. Beckman bestowed the sum of $40 million on the University of Illinois to create the Beckman Institute. His gift will bring together two different branches of science.

When I visited with Dr. Beckman in California last February to discuss the possibility of this magnificent philanthropy, I thought we were in big trouble because he said to me, "Jim, your president, Dr. Ikenberry, has made the most ambitious proposal to me, but I don't think I'm going to do it."

I asked why not?

He said, "Because I don't believe that private philanthropy should support public institutions. That lets the governor and the legislature off the hook. It's your job, not mine, to make the University of Illinois and its sister institutions across that state, the best. Private philanthropy ought to be reserved for private education."

I said, "Dr. Beckman, hold on a second. Let's talk about that!" And I said, "Cancel my golf game!"

For two and a half hours, we discussed the philosophy behind the partnership between private philanthropy and public obligation. At the end of that time he said, "Well you show me. You've told me what you're going to do in Illinois during this legislative session - this Build Illinois thing and your proposals for education - you just go back and show me."

We did. Last Saturday, he came to the campus of the University of Illinois and stood up before a lecture somewhat like this and said, "I violated all of my own rules and created the single greatest award by any American in the history of our country to a public university, matched not only by the action of

the General Assembly in upgrading education in this state from pre-kindergarten through post-graduate and in retraining present-day workers for new technologies. Matched not only by Build Illinois, but matched by a pledge from the Governor and the legislative leadership of this state to match this particular gift to the university - $10 million of taxpayers' resources, as well as perpetual endowment and maintenance."

That unique partnership between a public institution, a governor, a legislature and a private citizen will produce for the people of Illinois, all the people, all through the state of Illinois and eventually all through America and the world, extraordinary scientific, technological, and economic opportunity.

On Monday morning, the gentlemen from Tokyo and the gentlemen from Detroit told the world that their joint venture - a new auto plant - was coming to the prairies of central Illinois. State-of-the-art technology in the automotive world was replacing technology which had become outdated or which was challenged by foreign competition.

We didn't buy that plant. You can't buy that plant from companies who have more money than the State of Illinois. But what we did do, was demonstrate an abiding faith in ourselves. For the single largest share of the incentive package which won the allegiance of Chrysler-Mitsubishi was our willingness to invest Illinois tax dollars in training Illinois citizens for Illinois jobs. We believed in ourselves. And over the course of six long years, we sold ourselves to those two corporations. They like our attitude and they understood that in Illinois, we didn't complain about the past, but looked to the future.

Today, we come together at Fermilab, an extraordinary institution, the result of a partnership between the federal government, the government of the State of Illinois, the local government, and the private sector, between academia and politicians, and everyone in between.

When I came into Fermilab today, I was greeted with the same kind of spirit and enthusiasm that I've always found here. It's a remarkable place and I don't think it's duplicated in exactly the same way anywhere else in the State of Illinois. Every time I walk in that outer door, there are employees of all kinds standing at the door with a pride in their eyes that just cannot be replicated, and a spirit and enthusiasm for what they do and where they do it, that I've never seen matched. That kind of attitude is seizing a whole people in this state as we look to the future.

Fermilab just doesn't sit in abstract isolation on what were once prairies and now is the heart of the fastest growing strip of technology and economic progress in the Midwest and perhaps in the nation.

Here in the Fox River Valley, those who live and work at Fermilab have always been more than willing to share themselves with the community - not just the community of the Fox River Valley, but with the State of Illinois. Again, a partnership.

Part of the renewal of Illinois' educational system, which passed the legislature in late June and early July, came from the creative genius of Dr. Lederman of this institution. He was persuaded that Illinois needed to do more to compete, as technology rushed onward across the globe - that the children of Illinois needed a greater chance to compete with the children of the world, especially in the fields of math and science.

From that idea, enthusiastically endorsed by business and labor in this community, came the idea for the Math and Science Academy, embodied in reform legislation passed by the General Assembly, sponsored by Senator Etheredge, signed into law by me. Leon Lederman didn't have to do that. It's not part of his official job description. But he understands, as all of you at Fermilab understand, as everyone in the community of Illinois understands, the partnerships in progress.

Today we celebrate the most extraordinary partnership. In the words of Winston Churchill, "This is not the end, nor even the beginning of the end." But at 1 trillion volts, it is sure the end of the beginning. Thank you.


CRICK
DARWIN
BACH
PHIDIAS
GAUSS
BOHR
FREUD
WATSON
DAVINCI
GALILEO
EINSTEIN
PASTEUR
WHITMAN
PICASSO
ARISTOTLE
MAXWELL
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√-137
C U Ag Au Hg Cd

Secretary John S. Herrington
Secretary of Energy

Governor, Dr. Lederman, distinguished guests. How did you ever get out of California with Dr. Beckman? This is something we have got to look into. A supersalesman like you comes across the border again and I think you are going to need a visa. Talk about trade barriers!

I wish I had known 30 years ago what I have learned today, Leon. My physics professor at Stanford wouldn't have been so tough on me. I can hear it now:

"Dr. Graham, do you know that someday I'm going to get a chance to participate in the dedication of the Proton-Antiproton Collider?"

"The what?"

"Well, you see, Dr. Graham, the problem is in these superconducting magnets; there is going to be a heat problem in it. Did you know I'm going to have a lecture on high-energy physics by Dr. Lederman at the Fermi Laboratory, Dr. Graham?"

"Who's that?"

"Well, you see, Dr. Graham, there is this quark, and it actually is the top quark we are having the problem with. They had some problems over in CERN with it, and we have got to do some work to find out if this theory is valid. Then there is this. . ."

Well, you can follow the conversation. He wouldn't have been so tough on me on my physics exam. . . I know he wouldn't.

I have had a delightful morning and I had, for a minute, gotten caught up in Washington and I had forgotten the sharp wit and the collegiate atmosphere and the razor-sharp intellect among the scientists and the people that work here. The academic community, and the feeling that runs between all of you, is truly to be admired. When you leave an academic institution and you go into government or you go into business, sometimes you get away from some of this. It is a precious thing. It is a precious thing that we have in this country and at this Lab.

I had the privilege to sit in at a cabinet meeting recently, I think it was May, when John Young, who was the president of Hewlett-Packard at that time, chaired the President's Commission on Industrial Competitiveness, and they were reporting back to the president and the cabinet on America's position in the world.

The single thing they focused on, and what took up most of the discussion, was that this country must exploit its advantages, the things we are doing well. They identified one particular thing, and that was our national laboratories and the work and pure science and the ability to exchange ideas that we have among all of you. It is truly a "National Treasure."

The president was fascinated by this presentation, and he knows that his place as president depends on our leadership. The place of this country depends on his leadership to keep this advantage and keep us healthy in the scientific community.

I feel very honored to be with you, and to have this opportunity to participate in what I think is a wonderful project. I think if I had to pick one place I wanted to work today, it would be in the Detector. I don't want to throw any rocks at anybody else, but I love the size of that Detector. My mind was racing at what we could pass through that ring and look at. I may ask for a job in that after 3-1/2 more years.

I was supposed to have been here a few weeks ago when I escorted Vice Premier Li Peng, from China, into what was to have been a joint tour of the Braidwood Nuclear Power Plant up at Commonwealth Edison, and then down here at Fermilab; unfortunately, that day it was raining and our helicopters were grounded. We drove up there and just had a chance to look at the Braidwood Plant. The vice premier of China is, I think, indicative of the new generation in the Peoples' Republic of China; he is 53 years old, and he is an electrical engineer educated in Moscow. In his first visit to the United States he was full of questions. He was very technically oriented, and no one who talked to him was unimpressed by his desire to bring the PRC forward into the 21st century.

I had a fascinating time with him, but I wish he could have come here. I wish he could have seen another small part of what the American society, with its atmosphere of academic freedom and competition for ideas, is all about. The more the world knows about the nature of man, the better we all are. The more people like the Vice Premier Li Peng can see of a place like this, the better we all are.

I'm pleased to have the opportunity to learn in greater detail about the important work that you do here, because I am one of the stewards of tax-payers' money that goes in here. The more that I can find out about you and what you do, the better I can do my job.

President Reagan has a strong belief in the importance of science and technology to our nation's future. He believes in the excellence of education and basic research. This has

resulted in the continued support for basic research even in this period of budget cut-backs. He recognizes, just as I do, that in order to be strong as a nation, we are going to have to be strong in science.

Everyone here knows that science is of great importance to our modern life. Yet it also must be one of the most ancient of human activities. Throughout the sweep of recorded history, the stars have played a very important part in our lives. Somehow, somewhere, people first noticed that some stars moved differently than others, and they tried to figure out why. It turned out they weren't stars. . . they were planets. The motion of these planets and their moons were the clues that inspired human curiosity to seek an explanation.

This led to a systematic explanation that applied not just to those planets, but to all objects. This was the touchstone of the search for regularity and order in the phenomena of nature. I thought to myself this morning when Leon was talking, "Maybe we've come full-cycle," when he began to talk to me about some of the future projects you are talking about, trying to weave astrophysics back into the nature of what we have and the order that binds things together.

The urge to describe and explain, to explore, to systematize has led to an enormous acceleration in our understanding in recent years. So much so that many of you today concern yourselves with the very origins of our Universe. Searching for the hidden rules of nature's game is a very important thing to do.

Just a little more than a year ago, you dedicated the superconducting magnet system that allowed you to double the energy of the accelerator. Now you are preparing to move into a new realm with colliding beams of particles, and I am sure that there will be several important discoveries ahead.

Although my main purpose in coming here was to visit the Laboratory, this dedication provides to me a particular opportunity to meet with you distinguished scientists and distinguished guests, and to gain a personal appreciation of all that high-energy physics is about. It is indeed an honor and a thrill, and I appreciate it.

The research here at Fermilab has a lot in common with the origin of the Universe, and I know that it is not that you both began with a "big bang". . . that's a joke.

Honestly, Leon, the only time you lost me this morning was when you went to the wall, you looked at that "crib sheet," and you tried to place us as a society along that time line of the Universe. I felt humble and insignificant; I turned away. I

would have understood it, I'm sure, if I had stayed on it.

The remarkable fact that your modern version of searching for laws of nature has turned into a kind of telescope that can look back into the earnest beginnings is significant.

More importantly, I have seen Department of Energy support in action. The Department of Energy is the primary source of support for the nation's basic research in the physical sciences. High-energy physics receives more than 90% of its support from the Department of Energy. This support has made possible the research that has contributed to much of our knowledge of the fundamental structure of matter. At the same time, this research has stimulated the development of various technologies. It has become a source of national pride through the recognition of accomplishments by the awarding of Nobel Prizes to over 40 individuals, many of them here today, whose work is supported in part through the department's programs.

This facility right here represents scientific ingenuity at its best. The development of the superconducting magnet systems that make this possible is a truly remarkable accomplishment.

Tevatron II is now the world's highest-energy facility and as such, it should make possible some important discoveries. This upgrade builds on the basic facility and extends its capabilities in a cost-effective way.

While high-energy physics is not cheap, it is clear to me that those involved are working hard to get the most they can out of the funds available. For that, I as a taxpayer, and other taxpayers, give you our sincere gratitude. As the head of the Department of Energy, and as a citizen, that means a lot to all of us in these times of big deficits and big federal budgets.

This dedication, this celebration of the beginning of operation of the Tevatron Collider, is a remarkable accomplishment that has required the skills, the talent, the dedication of many scientists and engineers. It has also required the skill and dedication of many who serve in government. Without the strong support of these many individuals in the government, most of whom you never come into contact with, a project such as this could not happen. The support of basic research by our government is an essential element in our nation's long-term economic health.

This project represents one of the best examples of how government support of basic research advances our nation's goals. It provides a frontier that challenges our young people to seek and apply new knowledge. In this regard you here at Fermilab can be especially proud of your efforts to stimulate

interest on the part of high-school students in the basic sciences by bringing select groups of them here for Saturday Morning Physics lectures.

What a commendable effort that is! It epitomizes the spirit of the president's desire to improve the nation's education and promote excellence in science and technology. We need to encourage more use of our laboratories for this kind of purpose; the volunteer features of your program make it especially American and especially good for this country.

In response to the Department of Energy's encouragement along these lines, and partly in response to what you have done here at Fermi, several of our laboratories are now having groups of high-school students spend time at the labs to learn about the science and technology they do.

One activity that has spawned was centered at Lawrence Livermore Laboratory this summer, perhaps you have heard of it. We sent 52 of the nation's brightest students in mathematics, physics, and computer sciences to Livermore for two weeks this last summer to learn about super-computers and gain some "hands-on" experience with them. We asked the governors of each state to select their best students. We did the rest. It couldn't have gone better. The students learned a great deal, the Lab found it challenging, and, I understand, tried to hire some of them on the spot.

This brings me to my point, namely, that our national security isn't just the armed services. It is also the talent base of our nation that needs to be strengthened to improve our industrial competitiveness and our quality of life. We need to stimulate our young people to pursue careers in science; the national laboratories are one of the tools we can use to accomplish this. I hope we can do even more this next summer. Al Trivelpiece, our science advisor, has assured me that he is working on this at full speed.

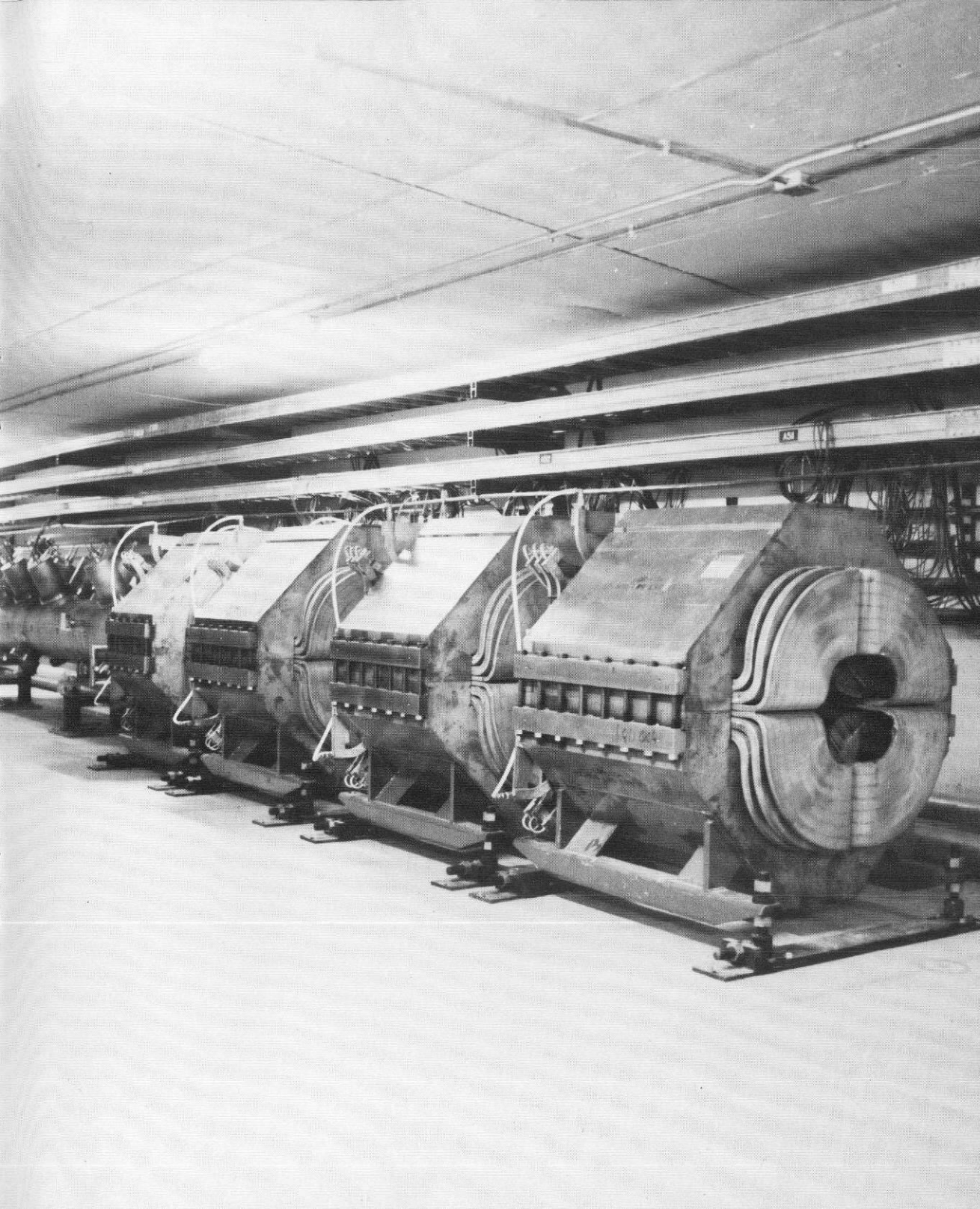
I want to commend Governor Thompson for his efforts in this regard. I just learned about the Illinois Math and Science Academy. I understand that the proposal to do this had its origins here at Fermilab, Governor. Governor Thompson wisely included a request for funding for this academy in his proposed budget. The budget bill has now passed and efforts are under way to get started on the project. I think this is a great way to go, and I wish you every success in this new venture.

As I noted at the outset of my remarks, this accelerator is a tool with which we can learn more about the fundamental forces of nature that comprise our Universe, a goal that originated in antiquity and towards which we have been making remarkable

progress. I want to congratulate all of you that had a hand in bringing this about, I know there were many of you. This includes those back in the Atomic Energy Commission, the Energy Research and Development Administration, and the Joint Committee for Atomic Energy. All of those had the vision to set in motion the events that led to the creation of Fermilab. It also includes those who have supported the Laboratory along the way as the Department of Energy came into existence in 1977.

It includes the scientists and engineers who conceived of the ideas and developed them into working accelerators. But last, far from least, I want to congratulate Bob Wilson and Leon Lederman for their leadership in guiding the building and the operation of this Laboratory.

I know that Fermilab will continue its outstanding scientific accomplishments in the tradition of those who went before you. I am pleased and honored to have had the opportunity to help you celebrate the Dedication of the Tevatron Collider. Good luck to all of you with these studies and your new challenges. Thank you.



Dr. Edward A. Knapp*
President, Universities Research Association, Inc.

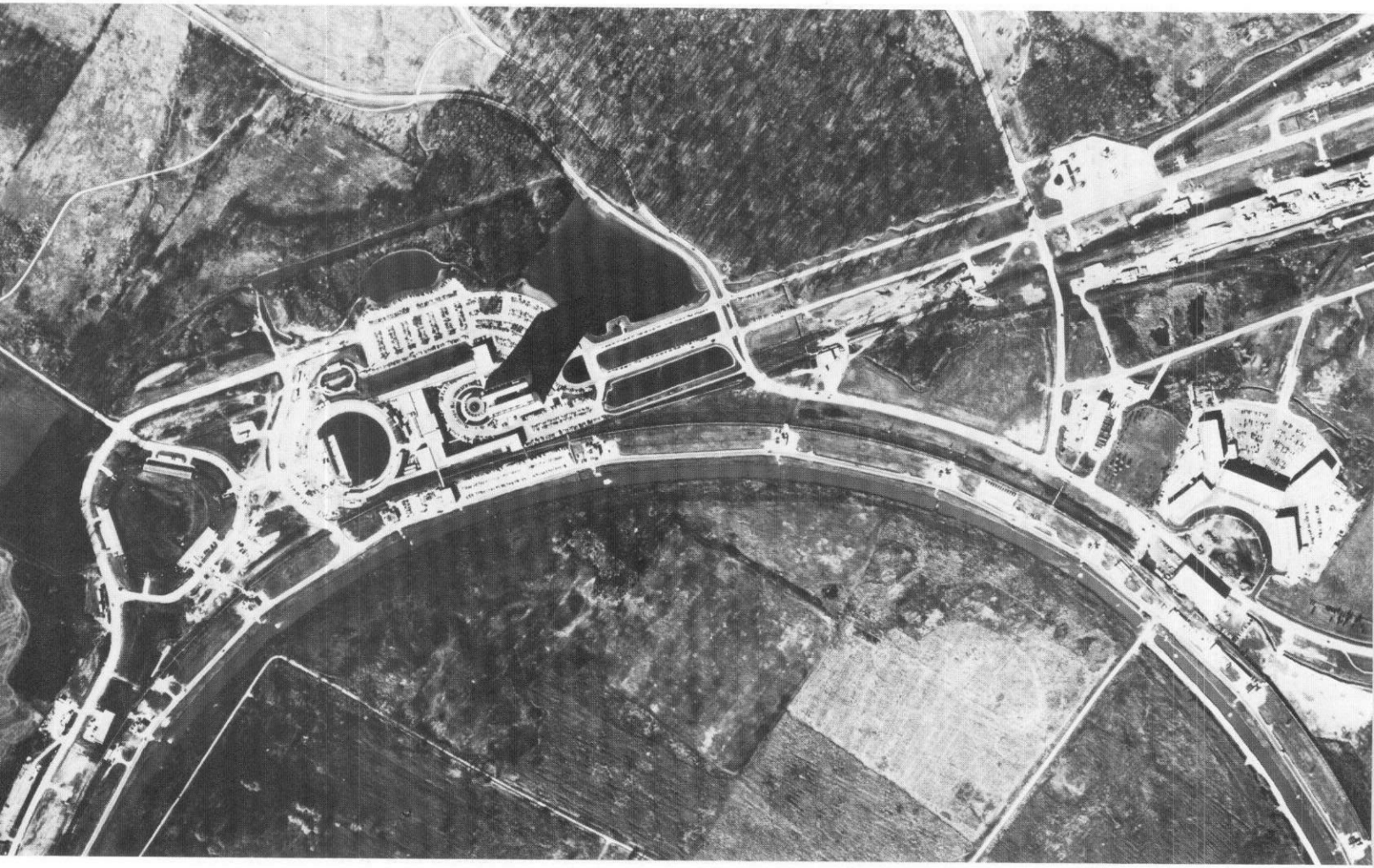
Leon said to try to keep this very, very brief so it will be. Mr. Secretary, Mr. Ambassador, Governor, and distinguished guests, it's a rare pleasure as my first official public duty as the new president of Universitites Research Association to briefly address this festive gathering. The Universities Research Association is the operating contractor for this fabulous Laboratory, for the Department of Energy, and most important, for the American universities that we represent. We, in the United States, have consciously decided that basic science should be centered in our university system as contrasted with the Soviet and several other European scientific establishments who support basic science in an institutional setting vastly different from ours.

URA is an association of fifty-six American universities, and the bulk of the research done at this Laboratory is undertaken by visiting university researchers who travel here at substantial personal sacrifice to participate in this incredibly exciting endeavor of discovery. Leon's title for today's dedication, "A Celebration of Science" indicates a unity of science which we must never forget. While we may wish to construct this or that facility, perform this or that experiment as scientists, it is critically important for our country that all of American science in our universities and national laboratories stay healthy and productive. And just as our federal government is undergoing a crisis of unprecedented magnitude in its budgetary process, running deficits which are truly mind-boggling in proportion, so is American science in a crisis of support which could, if not carefully managed, severely damage our long-term world position of scientific and technological leadership. Most scientific investigations, not just those in fundamental interaction or high-energy physics, are in severe need of new and expensive facilities and instrumentation. From my experience at the NSF I know of the opportunities in astronomy, oceanography, material science, geology, mathematics and computer science, chemistry and on and on, which are far beyond our extrapolated fiscal ability to fund and which will keep America competitive and productive for future generations if we can discover a sensible way to support them. And I believe, as this administration does, that the support of fundamental as opposed to applied or developmental science is a proper role for government support.

*Luncheon address

Just as our defense establishment is an investment for the common good which in principle is not seriously questioned within or outside the government, so is our support of basic science for the common good, and it is really not supportable from other sources. Fundamental interaction physics holds incredible promise for the future. Of the basic sciences it's probably the most long term in nature of application of its discoveries and knowledge, but the most profound in the nature of the influence of these discoveries on the activities and results of other sciences and technology. This is graphically illustrated by examples from a historical context. High-energy physics is the linear descendant from the science of Maxwell, who unified electricity and magnetism in the 1800's, and the giants of physics in the 1920's and 30's who developed the understanding of the quantum nature of atomic matter. Almost every aspect of our present technological society depends on the conceptual and calculational understanding developed in these years. We are now on the threshold of understanding another interaction of matter: the interaction which binds nuclei together and makes up the structure of the subnuclear particles. I have no idea what the applications of this knowledge will be twenty, fifty, or one hundred years from now, I only know there will be applications and these applications will profoundly shape our lives.

I strongly believe it's our responsibility to all work together to insure the future vitality of our basic science enterprise. Department of Energy, National Science Foundation, NASA, National Institutes of Health and others all have to develop strategies to support science into the next decade for the future prosperity of all the American people.



Acknowledgements

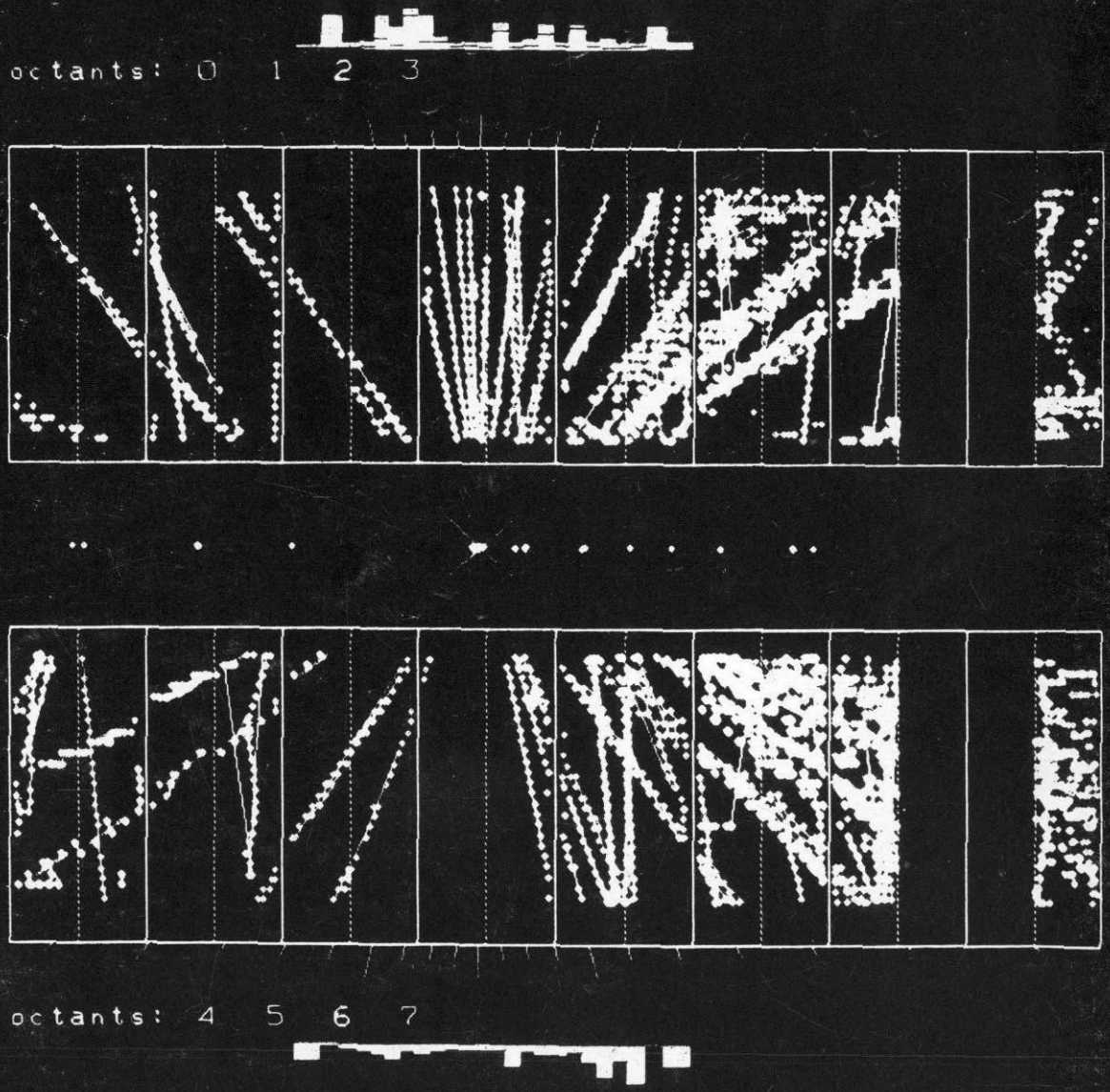
The front cover photograph is of Enrico Fermi (1901-1954)

On the back cover is the event display (original in color) of CDF event #15, the first proton-antiproton collision at 1.6 TeV, which occured at 3:30 a.m. on Sunday, October 13, 1985.

The illustrations on the inside front cover and on page 23 are by Angela Gonzales.

The illustration on page 3 is a German wood-block print, circa 16th century.

Photography by the Fermilab Photography Unit.



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