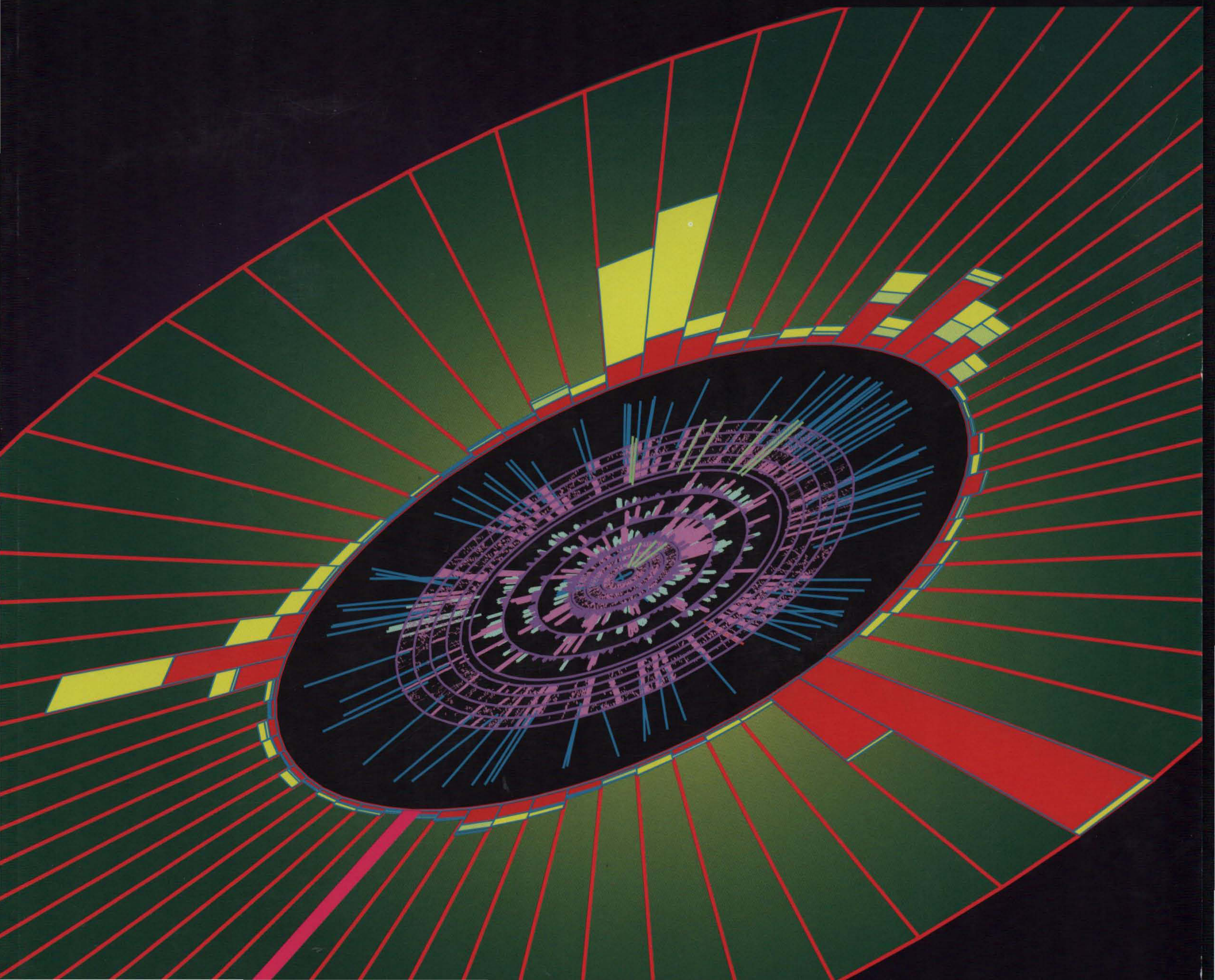
Universities Research Association, Inc.

2000-2001 Annual Report



URA Serves University Scientists

URA IS "an entity in and by means of which universities and other research organizations may cooperate with one another, with the Government of the United States, and with other organizations, toward the support and use of laboratories, machines, and other research facilities, and toward the development of knowledge in the physical and biological sciences."

It was created "...for research, development and education in the physical and biological sciences, including all aspects of the field of high-energy physics, nuclear energy, and their engineering and other applications; and to educate and train technical, research and student personnel in said sciences."

Physicists from 34 states and 25 countries use particle accelerators at Fermi National Accelerator Laboratory in Illinois for forefront research in particle physics.

In this aerial view of Fermilab, the 16-story Wilson Hall stands on the Illinois prairie adjacent to the 4-mile Tevatron accelerator ring (right), with the 2-mile Main Injector in the foreground.

UNIVERSITIES RESEARCH ASSOCIATION, INC.

2000-2001 Annual Report

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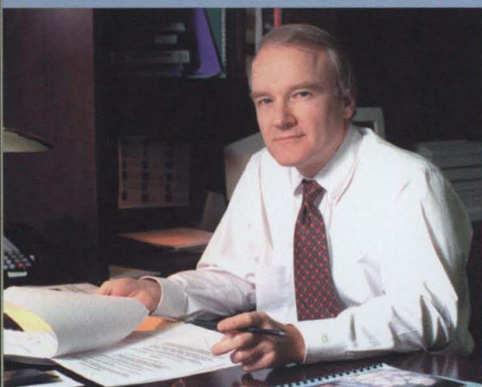
URA is a private not-for-profit corporation. A consortium of research universities, it serves as a contractor to the federal government for the operation of major scientific facilities. This volume—updated annually with new financial and organizational data—provides the historical context for URA's structure and mission, as well as highlights of its contributions to science, technology, industry and education.

Message from the URA President



URA President, Frederick M. Bernthal

FOR URA AND ITS 89 MEMBER UNIVERSITIES, this year has been one of major new undertakings. Our flagship enterprise, Fermilab, in a pastoral setting that combines the qualities of environmental field laboratory, public park, and nature reserve, is generating new excitement in its role as world leader at the high energy frontier of particle physics and associated sciences. In his second year as Director of Fermilab, Dr. Michael Witherell presided over a line-up of projects and experiments, planned or underway, more exciting than any in the 30-year history of the Laboratory.

The Tevatron, rejuvenated and enhanced with the addition of the Main Injector, began initial shake-down operations for the much-anticipated Collider Run II, which officially began as scheduled, in March of 2001. With assistance from a major infusion of users from around the country and the world, the Laboratory also completed work on the newly upgraded "DZero" and "CDF" detectors, in time to begin taking physics data in the fall of 2001. The intense activity leading up to "Run II" was made all the more exciting by the announcement of tantalizing hints of the Higgs Boson (once dubbed "The God Particle" by Fermilab Director Emeritus Leon Lederman), in experiments since ended at CERN in Geneva, Switzerland.

Major civil construction is underway on the $170 million Neutrinos from the Main Injector (NuMI) project, an experiment designed to probe whether nature's elusive neutrinos have measurable mass. When this project is completed, neutrinos produced at Fermilab will be seen by a detector to be located deep underground in the former Soudan iron mine in northern Minnesota, a site that is also hosting a UC-Berkeley, Stanford, Case-Western Reserve, and Fermilab collaboration to search for the enigmatic "Cold Dark Matter" in the universe.

In Mendoza Province of Argentina, work is nearing completion on the "Engineering Array", the first major construction milestone at the southern-hemisphere site of the Pierre Auger Cosmic Ray Observatory. The initial $7.5 million U.S. share of this $100 million project is jointly funded through URA by DOE and NSF. Under the leadership of Nobel-laureate Professor James Cronin of the University of Chicago, the project involves scientists from some 15 countries, who will study the mysterious origins of cosmic rays of energy 10^{20}eV, about 100 million times greater than the energy which Fermilab's Tevatron is capable of producing! If all goes as planned, a northern hemisphere component of the observatory will be added in Utah later in this decade.

In another look outward from our planet, Director Emeritus John Peoples is now engaged at Fermilab as the new full-time Director of the Sloan Digital Sky Survey. This ambitious project brings Fermilab's advanced information technology to traditional astronomy, and will digitize and analyze all objects observable in a 25% swath of our sky, as seen by the Project's 2.5-meter telescope at Apache Point, New Mexico. The Sloan facility was officially dedicated in October 2000, a few weeks after seeing "first light", and the scientific payoff even at this early date has been little short of spectacular.

Fermilab scientific, technical, and management talent also continues to lead U.S. participation in the European Large Hadron Collider Project at CERN, where many U.S. scientists will work at the new high-energy frontier of particle physics

The URA paradigm for university-government-laboratory partnership

beginning in the second half of this decade, in experiments that we hope will point the way toward a return of that frontier to the U.S. not long thereafter. In anticipation of such a return, Fermilab has joined with the Stanford Linear Accelerator Center to continue research and planning for a possible next-generation large particle accelerator.

The Annual Meeting of the URA Council of Presidents (our "shareholders") was held in late January, with John T. Casteen III, President of the University of Virginia, presiding and concluding his year as Chair of the Council. As always, Council business was combined with the annual Policy Forum, this year featuring addresses by Senator Jeff Bingaman, who later in the spring assumed the Chairmanship of the Senate Energy and Natural Resources Committee; Congressman Sherwood Boehlert, new Chair of the House Science Committee; Dr. Neal Lane, who had just stepped down from his position as Science Adviser to the President; and Dr. Millicent Dresselhaus, who also had just completed service as Head of DOE's Office of Science. Representatives from some 70 URA member universities attended.

URA benefits greatly from the help of many distinguished individuals, who voluntarily provide leadership on our Board of Trustees, on the Fermilab Board of Overseers, and in related oversight activities. Among them, Joe B. Wyatt, who last year stepped down after 18 years as Chancellor of Vanderbilt University, continues to serve as Chair of the URA Trustees; Robert Galvin, former CEO of Motorola, whose many and varied contributions to the national research enterprise are well-known, continues to provide his wise counsel to URA as Vice-Chair of the Trustees; and David Shirley, Director Emeritus of the Lawrence Berkeley National Laboratory, serves as Chair of the Fermilab Board of Overseers. Dr. William Marciano of Brookhaven National Laboratory again chaired the URA Visiting Committee's annual review of Fermilab.

As new chapters in the history of URA scientific programs are written, our activities and plans remain grounded in the original URA Articles of Incorporation, key excerpts of which appear on the inside cover of this report. The extraordinary talent that assembles voluntarily from around the country and the world to assist URA in its undertakings affirms the benefits that derive from the URA partnership between our national laboratories and our nation's research universities. The URA paradigm for university-government-laboratory partnership has by now been frequently emulated, not only in DOE's activities, but in other agencies as well.

In keeping with our charter and planning, URA remains ready to respond to other appropriate opportunities to serve the U.S. and international research community. In that spirit, we look forward to another exciting year of service to our university community and to the American people, as we continue the infinite voyage of scientific discovery.

Member Universities

Christine Jefferson, a student in Fermilab's Graduate Engineering for Minorities (GEM) program, working on the development of state-of-the-art scientific equipment.

ALABAMA
University of Alabama-Tuscaloosa

ARIZONA
Arizona State University
University of Arizona

CALIFORNIA
California Institute of Technology
University of California-Berkeley
University of California-Davis
University of California-Irvine
University of California-Los Angeles
University of California-Riverside
University of California-San Diego
University of California-Santa Barbara
San Francisco State University*
Stanford University

COLORADO
University of Colorado-Boulder

CONNECTICUT
Yale University

FLORIDA
Florida State University
University of Florida

HAWAII
University of Hawaii-Manoa

ILLINOIS
University of Chicago
University of Illinois-Champaign/Urbana
Northern Illinois University
Northwestern University

INDIANA
Indiana University
University of Notre Dame
Purdue University

IOWA
Iowa State University
University of Iowa

KANSAS
Kansas State University

LOUISIANA
Louisiana State University
Tulane University

MARYLAND
Johns Hopkins University
University of Maryland-College Park

MASSACHUSETTS
Boston University
Harvard University
Massachusetts Institute of Technology
University of Massachusetts-Amherst
Northeastern University
Tufts University

MICHIGAN
Michigan State University
University of Michigan
Wayne State University

MINNESOTA
University of Minnesota

MISSOURI
Washington University

NEBRASKA
University of Nebraska-Lincoln

NEW JERSEY
Princeton University
Rutgers University

NEW MEXICO
New Mexico State University
University of New Mexico

NEW YORK
Columbia University
Cornell University
University of Rochester
Rockefeller University
State University of New York-Buffalo
State University of New York-Stony Brook
Syracuse University

NORTH CAROLINA
Duke University
University of North Carolina-Chapel Hill

OHIO
Case Western Reserve University
Ohio State University

OKLAHOMA
University of Oklahoma

OREGON
University of Oregon

PENNSYLVANIA
Carnegie Mellon University
Pennsylvania State University
University of Pennsylvania
University of Pittsburgh

RHODE ISLAND
Brown University

SOUTH CAROLINA
University of South Carolina

TENNESSEE
University of Tennessee-Knoxville
Vanderbilt University

TEXAS
University of Houston
University of North Texas
Prairie View A&M University*
Rice University
Southern Methodist University*
Texas A&M University
Texas Tech University
University of Texas-Arlington
University of Texas-Austin
University of Texas-Dallas

UTAH
University of Utah

VIRGINIA
Virginia Polytechnic Institute
University of Virginia
College of William and Mary

WASHINGTON
University of Washington

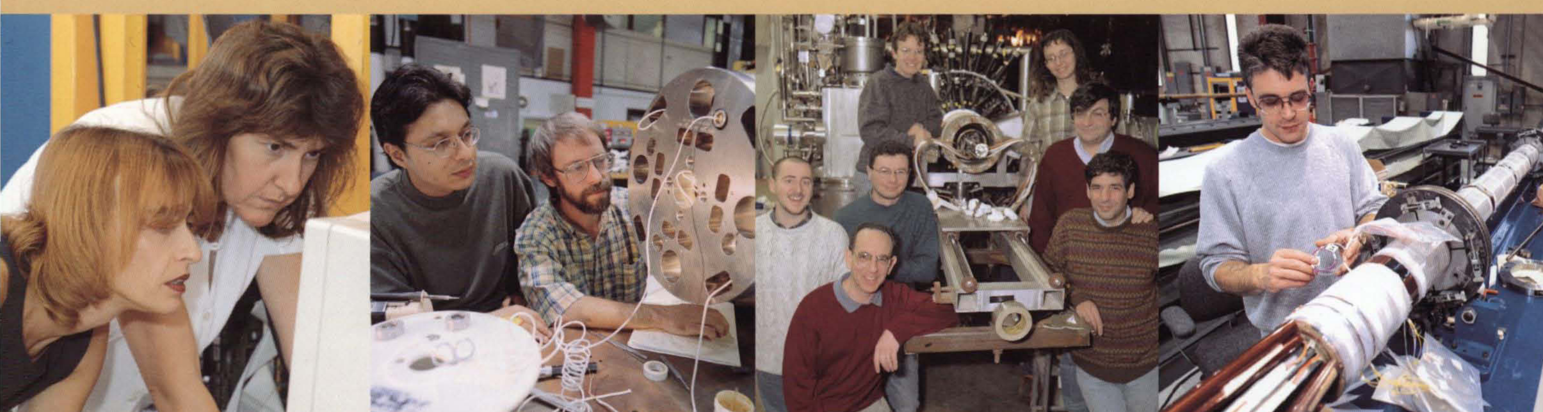
WISCONSIN
University of Wisconsin-Madison

CANADA
McGill University
University of Toronto

ITALY
University of Pisa

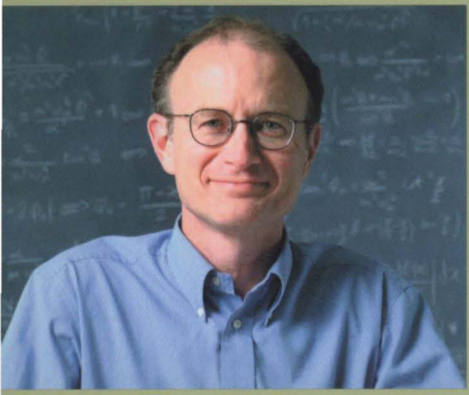
JAPAN
Waseda University

**Associate member institution*



Fermilab users from around the world work with the Laboratory's employees to advance the frontiers of particle physics.

Fermilab



Fermilab Director, Michael Witherell

FERMI NATIONAL ACCELERATOR LABORATORY, 30 miles west of Chicago, is a Department of Energy national laboratory with the primary mission of advancing the understanding of the fundamental nature of matter and energy.

Fermilab is the home of the Tevatron, the world's highest-energy particle accelerator. Particle beams circle through rings of magnets four miles in circumference to generate experimental conditions equivalent to those that existed in the first quadrillionth of a second after the birth of the universe. This capability to recreate the energy levels of the Big Bang places Fermilab at the frontier of global particle physics research, providing leadership and resources for qualified experimenters to conduct basic research at the leading edge of high-energy physics and related disciplines.

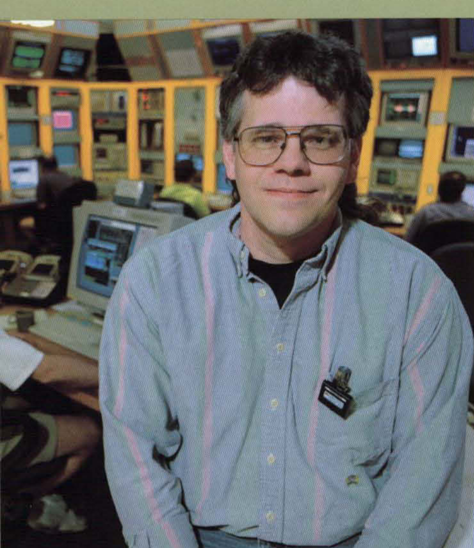
Fermilab currently provides research facilities for about 2,500 particle physicists, from 204 institutions in 34 states and 25 foreign countries. Typically, the U.S. scientists' research is supported by DOE and the National Science Foundation, and in some cases by university funds.

Fermilab began operations in the early 1970s with a single beam of protons directed at a fixed target and has upgraded its capabilities over the years to take successive steps into the interior of the atomic nucleus. The Laboratory's first major upgrade was the development of the Tevatron, the world's first superconducting synchrotron, with beam energies of approximately one TeV or one trillion electron volts. It operated initially in 1983, and in 1989 the National Medal of Technology was awarded to the leaders of its design and construction team. Another vital upgrade enabled the Tevatron to become a collider, accelerating antiprotons as well as protons to TeV energies, in beams traveling in opposite directions, to produce collisions at selected interaction regions. The first proton-antiproton collisions were achieved in 1985, and now two 5,000-ton detectors, CDF and DZero, track and record the subatomic particles that emerge from proton-antiproton collisions. The collaborations that use these detectors announced in March 1995 the discovery of the top quark, a fundamental particle with an electric charge two-thirds that of the electron, and a mass nearly equal to that of an entire atom of gold. In late 1997, the Laboratory ended Tevatron Collider Run I in order to make major improvements to the Fermilab accelerator complex and the two big collider detectors. Meanwhile, the last run of the Tevatron fixed-target program was completed in early 2000.

During 2000, experiment collaborations continued to analyze data and uncover new scientific results from preceding collider and fixed target runs, and the Laboratory made progress on important accelerator-related projects and detector upgrades to produce new physics in the next Tevatron run. Construction continued for new neutrino experiments, as did R&D on options for future accelerators. In addition, the Laboratory moved ahead in its collaborations in three non-accelerator projects at the forefront of research in astrophysics. In March 2001, Collider Run II began at Fermilab, and scientists from U.S. universities and others around the world resumed probing the smallest dimensions that humans have ever examined.

Fermilab's Wilson Hall is a landmark for both the local neighborhood and the high-energy physics community.

The Fermilab program is addressing important issues with new experiments



Stan Johnson of Fermilab's Beams Division in the Main Control Room for the Laboratory's accelerator complex.

THE FERMILAB PROGRAM AND THE FIELD OF PARTICLE PHYSICS

The remarkable progress of particle physics over the past few decades is well known and widely celebrated. The good news about the future is that the prospects for new fundamental discoveries in the next decade are as great as at any time in the history of the field. New experiments will be able to answer questions that have been central to the field for some twenty years:

1. What sets the magic energy scale of about 200 GeV that determines so many fundamental characteristics of matter?
2. Is there a new set of supersymmetric particles, one partner for every particle already observed, as one fundamental theory (string theory) predicts? Are there effects of extra space-time dimensions at this scale?
3. Does the "Standard Model" of particle physics predict all manifestations of charge-parity (CP) violation, the asymmetry between matter and antimatter?
4. Does the evidence for very small neutrino masses signal some new physical phenomenon at a very high mass scale, beyond that directly accessible in accelerator-based experiments?
5. Is there dark matter in the universe made of some new type of particle? Might that be the supersymmetric particles?

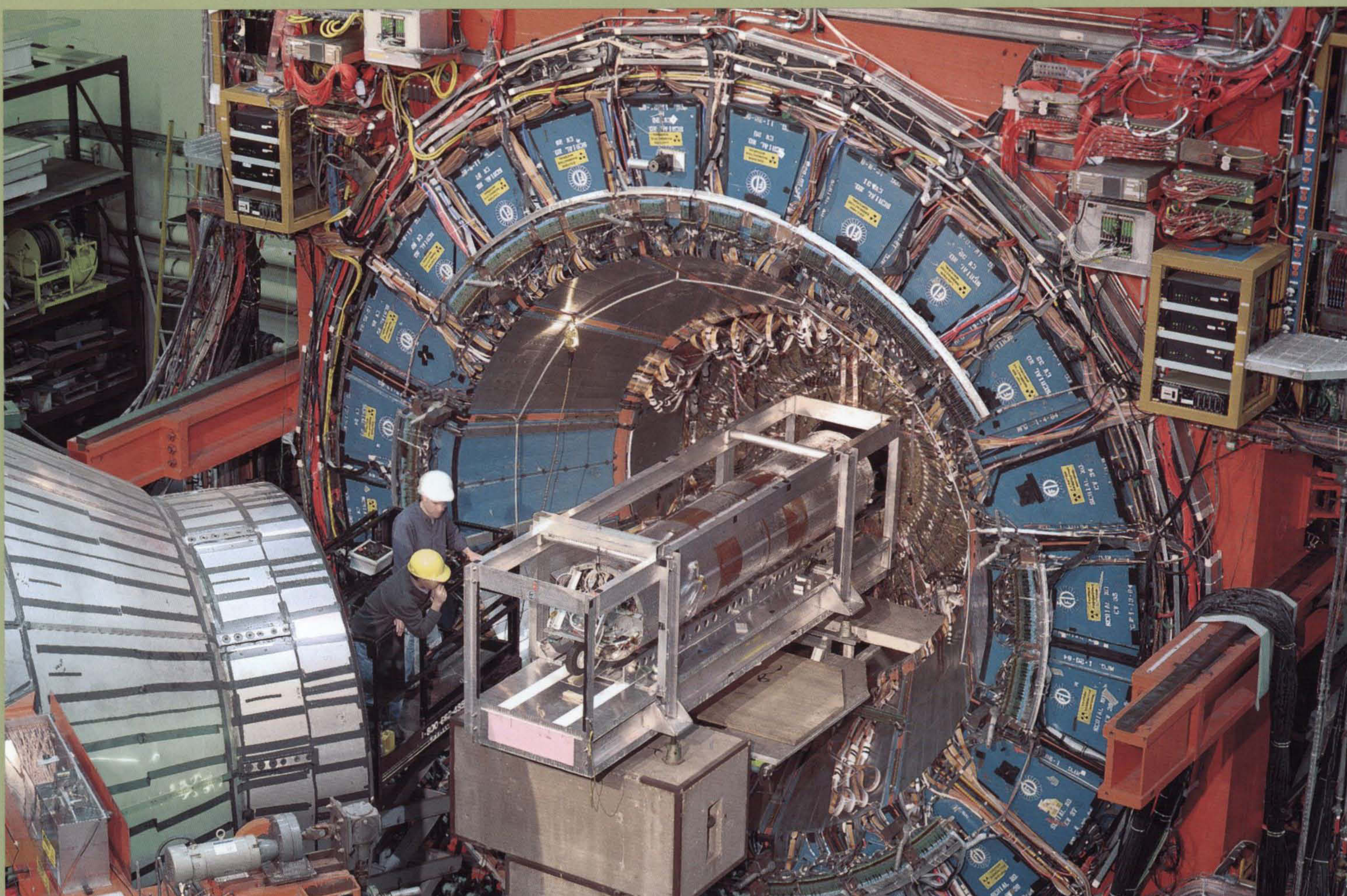
The Fermilab program is addressing all of these important issues with new experiments. The addition to the accelerator complex of the Main Injector has revitalized the experimental program; and, over the next several years, the Tevatron Collider will be the center of the search for new physics at the highest energy available at any accelerator facility. For example, discovery of the predicted, but as yet unobserved, Higgs boson would lead to an understanding of what determines the masses of the elementary particles.

Fermilab is also developing a superb neutrino program that will contribute essential information on the puzzling question of neutrino masses and oscillations. In addition, the Laboratory is the center of U.S. activity in preparing for the scientific program at the Large Hadron Collider (LHC), now under construction and at CERN, the European Laboratory for Particle Physics in Geneva, Switzerland. The LHC is currently scheduled to begin operations in 2007, and at that time, the high-energy frontier in particle physics will shift to Europe.

HIGHLIGHTS OF 2000-2001

Fermilab has been in a period of intense construction activity as the Laboratory prepares for the next phase in the evolution of its science program. Much of the Laboratory's effort has been focused on the Tevatron Collider program. The Laboratory has been able to keep to the schedule published in September 1999 that included a March 1, 2001 startup date for operation of the new Collider complex.

On September 14, 2000, CERN announced that it was extending the last scheduled run of LEP, its electron-positron collider, by one month in response to the hint of a signal for the Higgs boson with a mass of about 115 GeV. With the risk of a costly delay in the LHC project, and weighing the fact that it would take yet another year of running to clarify the Higgs picture, CERN management decided to end the LEP run on November 2, 2000. Thus, Fermilab's Tevatron Collider now stands alone at the energy frontier for the next six years, and the CDF and DZero collider detector collaborations have an excellent opportunity to discover the Higgs boson if its mass is in fact in the region of 115 GeV. However,



such a discovery will require an aggressive program of further upgrades to the accelerator complex and the collider detectors over the next few years.

Although most of the Laboratory effort in the past year went into constructing new experiments and preparing the accelerator complex for Collider Run II, the various collaborations of experimenters at Fermilab produced a total of 63 new publications based on results from the final 800 GeV fixed-target run and from further analysis of data from Collider Run I. In addition, 53 Ph.D. candidates completed theses based on research they carried out at Fermilab.

On July 21, 2000, the DONUT detector collaboration announced the first direct observation of the tau neutrino, the last of the twelve fundamental constituents, that is quarks and leptons, of the Standard Model of particle physics. The CDF and DZero detector collaborations continued to report more precise measurements, both in support of leading theories and in the search for new phenomena beyond the current Standard Model. DZero has developed a web-based computer tool to allow physicists worldwide to search the collaboration's data for evidence of new physics.

Scientists install an advanced silicon vertex detector into the center of the upgraded CDF detector in preparation for Tevatron Collider Run II.

Fermilab's two collider detectors have reinvented themselves for the new, higher event rate environment of Collider Run II

Of great interest are recent results from the CDF and KTeV collaborations on the very small asymmetry in the behavior of matter in certain particle interactions, namely meson decays that violate what is called charge-parity or time reversal symmetry. This phenomenon is key to understanding how matter came to predominate over antimatter in our universe, because without it, there would be no stable aggregations of matter in the form of stars, planets and, ultimately, life. In addition, a collaboration studying the states of "charmonium" (particles composed of a charm and an anticharm quark) completed taking data in the antiproton accumulator in 2000.

ACCELERATOR AND DETECTOR UPGRADES

The Main Injector is the new 120 GeV accelerator that serves as an injector to the Tevatron and the driver for the production of the antiprotons collected by the Antiproton Source. Due to its increased beam intensity, the Main Injector allows Fermilab to increase the rate of antiproton production. The Laboratory will run future fixed-target programs with 120 GeV protons from the Main Injector. The Recycler is a storage ring that will recapture most of the antiprotons that have heretofore been thrown away at the end of each collider store, to increase further the number of antiprotons available for colliding beams. All of the accelerator improvements combined will provide a proton-antiproton collision rate ten times that of Run I, the previous collider run at Fermilab.

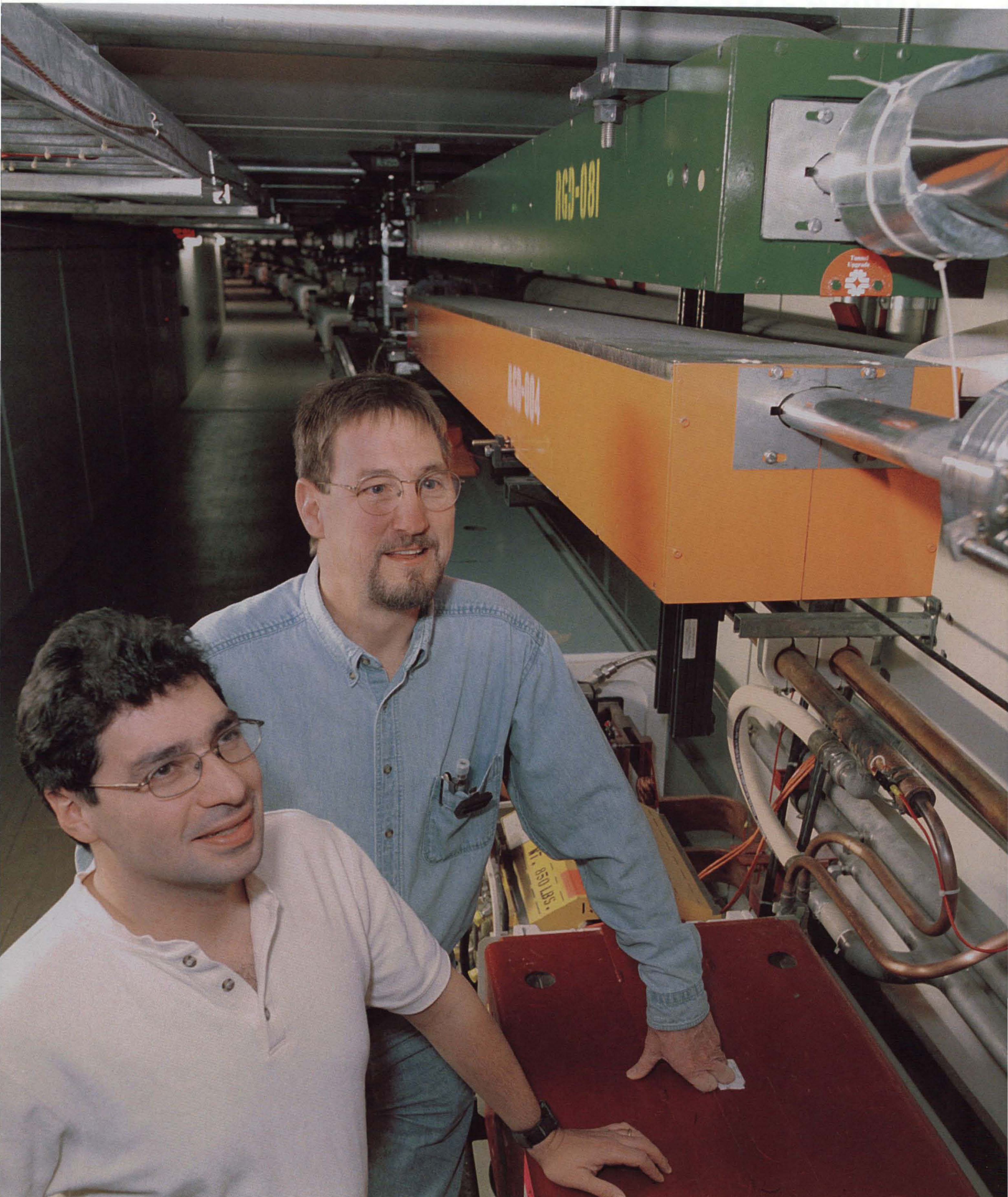
mbers of the international DZero collaboration, h the massive detector (background) installed the Tevatron beamline in preparation for llider Run II.

The $260 million Main Injector was completed in 1999 on time and under budget, and then began its commissioning phase in support of the 1999 Tevatron fixed-target run. During the past year, Recycler commissioning also progressed, while improvements have continued in the rest of the accelerator complex, including improved performance of the Tevatron and completion of a major rebuild of the Antiproton Source. Technical modifications have been made to the Tevatron to allow 36 bunches of protons and antiprotons to collide, rather than the six bunches of the last collider run.

In addition, construction work was completed for a new experimental hall at the Tevatron's CZero interaction region. It is planned to use the new hall for BTeV, an experiment dedicated to the physics of the B meson, including an exploration relevant to the matter-antimatter asymmetry in the universe.

Fermilab's two collider detectors have reinvented themselves for the new, higher event rate environment of Collider Run II. The CDF and DZero collaborations began to tear apart their respective detectors after the end of Collider Run I, and then proceeded with a major rebuilding program. Foremost among the challenging schedule issues for both collaborations was delivery of silicon sensors and readout chips for particle tracking. For the start of Collider Run II in 2001, these more sophisticated, more agile and more powerful detectors are now ready for the barrage of high-energy collisions created by the Tevatron, which will produce data at the rate of a petabyte (10^{15} bytes) per year. (It would take a billion floppy disks to hold a petabyte of data.) The Run I data total of 40 terabytes ($4x10^{13}$ bytes) per detector will be dwarfed by this prodigious new technological achievement.

Scientists Naba K. Mondal and Tom Diehl working on DZero detector electronics.



Fermilab experiments will explore the question whether neutrinos are massless, or actually have a small mass.

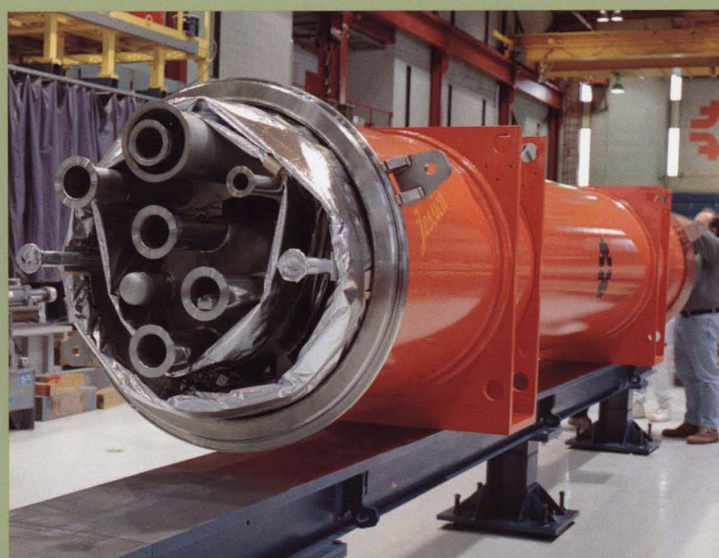
THE LARGE HADRON COLLIDER

As Fermilab prepares for its next collider run, the Laboratory also has a significant role in building the collider that will eventually overtake the Tevatron at the energy frontier. Through DOE and NSF, the United States is investing $531 million over eight years in the LHC at CERN and two of its associated detectors. The U.S. is one of several non-CERN-member states, including Canada, Japan, India and Russia, contributing to the LHC.

When the LHC begins operating sometime in 2007, it will reach an energy seven times the energy of Fermilab's Tevatron. The LHC will provide a unique and affordable opportunity for U.S. scientists to continue to work at the energy frontier, and it will allow Fermilab to develop the technologies for building the accelerators that will someday surpass the LHC's capabilities.

U.S. participation in the LHC has important consequences for Fermilab. The Technical Division's Jim Strait is the project manager for the U.S. contribution to the accelerator, leading a collaboration that includes Fermilab and the Brookhaven and Lawrence Berkeley National Laboratories. Most of the R&D for the advanced superconducting quadrupole magnets for the LHC's interaction regions has been done at Fermilab, and most of the fabrication of these magnets is also taking place at Fermilab.

DOE and NSF have asked Fermilab to oversee project management for the U.S. contribution to the CMS detector, one of the LHC's two major detectors. Several years ago, the U.S. CMS collaboration asked Fermilab to serve both as one of its collaborating institutions and as its host laboratory, and Fermilab and URA agreed. The collaboration made excellent progress in the past year, and the U.S. CMS construction project continues to be on schedule and on budget. Fermilab has also been chosen to be the major U.S. CMS regional computing center, one of the few such centers around the world.



A prototype superconducting quadrupole magnet for the LHC at CERN, being assembled at Fermilab.

NEUTRINO EXPERIMENTS

In project NuMI (Neutrinos at the Main Injector), Fermilab will provide a high-intensity neutrino beam for experiments that will explore the question of whether neutrinos are, in fact, massless or actually have a small mass. Fermilab will use the Main Injector to create a beam of muon neutrinos aimed through the earth to the MINOS experiment, a detector deep underground at the Soudan Underground Laboratory, in a former iron mine in northern Minnesota. If MINOS should reveal that some of the muon neutrinos have changed "flavor" to become tau neutrinos during their 730-kilometer journey from Fermilab to Minnesota, that change would confirm that neutrinos do indeed have mass. If they do, the implications of such a result will be

ns Gattuso and Dave Johnson of
rmilab's Beams Division inspecting the
cycler in the Main Injector Tunnel.

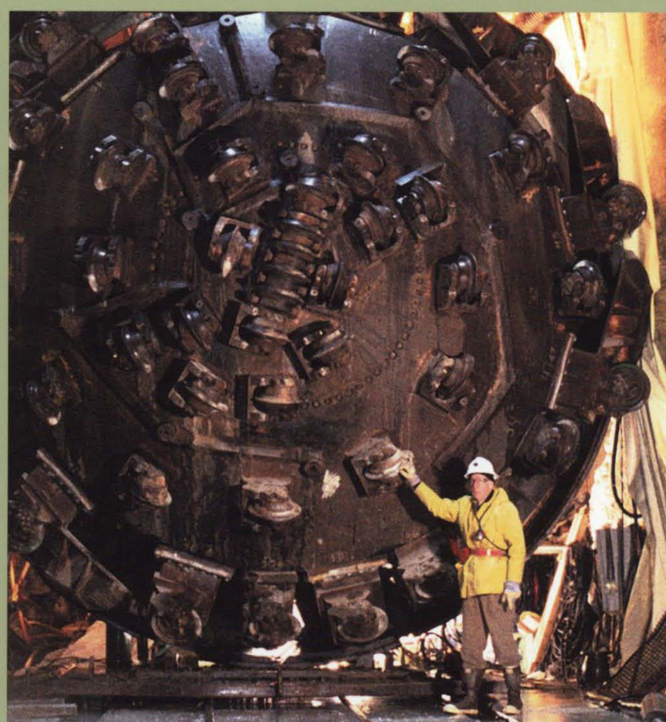
Fermilab's Main Injector has produced greater than expected distribution of beam to users.

profound. Design and engineering work for the beamline began in late 1997. Civil construction activities began in 1999, both on the Fermilab site and at Soudan.

In late 2000, Fermilab managers and NuMI collaborators faced increased project costs and schedule delays, due primarily to challenges associated with beamline technical components and with underground excavation on the Laboratory site. An expert DOE review panel met at Fermilab in November 2000 and May 2001 to consider the Laboratory's proposed "rebaselining," or redefining, of the project's cost and schedule. Over the last two years Fermilab has made the preparations for the start of Collider Run II the Laboratory's highest priority, leaving limited resources for other projects, such as NuMI. With the punctual start of Run II in March 2001, the Laboratory has assigned additional manpower and expertise to the NuMI project. In addition, the Laboratory has reorganized NuMI/MINOS management to address critical areas of the project. A DOE review of the refined cost, schedule and management for NuMI is to be held in September 2001. The Laboratory and the MINOS collaboration now expect that the experiment will begin operating in 2004.

A separate, complementary neutrino experiment, MiniBooNE, will use beam from Fermilab's 8 GeV Booster. The MiniBooNE collaboration will search for the flavor change of muon antineutrinos to electron antineutrinos, and will provide a definitive answer to questions raised by evidence for such neutrino oscillations in an experiment based at Los Alamos National Laboratory. Construction of the MiniBooNE experiment began in October 1999. Civil construction for the new 8 GeV proton beam facility began in 2000. The Laboratory is scheduled to deliver proton beam to the detector for commissioning by late 2001, and the MiniBooNE collaboration is scheduled to begin taking data in April 2002.

ers of the international MINOS
oration stand in front of a slice
neutrino detector.



The front end of a tunnel boring machine seen at work during underground construction for the NuMI project.

ASTROPHYSICS

All of the proposals for extending the domain of validity of the Standard Model of particle interactions predict new particles. If these particles are stable, then large numbers of them will have survived the moment of creation and will still be present. Should that be the case, they could make up a significant fraction of the mass of the universe. Searches for these massive particles of "cold dark matter" are underway. Fermilab is a member of the collaboration of ten institutions in the Cryogenic Dark Matter Search (CDMS). These collaborators have developed very

Fermilab is also engaged in a collaboration that aims to find out how matter, both dark and luminous, is distributed

sensitive detectors that can detect the recoils of germanium or silicon nuclei if they collide with one of these massive particles. The CDMS collaboration has recently made public the most sensitive limits on such dark matter on the basis of the preliminary experiment at a shallow underground site on the Stanford University campus. Now Fermilab is managing the project to build a larger and more sensitive CDMS experiment in the same Soudan Underground Laboratory that will house the MINOS experiment.

The Sloan Digital Sky Survey installation at the Apache Point Observatory in Sunspot, New Mexico. The survey's 2.5 meter telescope is seen at the left.

Fermilab is also engaged in a collaboration that aims to find out how matter, both dark and luminous, is distributed. This project, the Sloan Digital Sky Survey (SDSS) will measure the location and red shift of a million galaxies and a hundred thousand quasars in the northern galactic cap. Among Fermilab's many contributions to this project is the construction of the data acquisition system and the software and hardware to process the expected 10 to 20 terabytes of data that will be accumulated during the roughly five-year span of the survey. The SDSS collaboration, comprising nine institutions, has built a 2.5-meter telescope and the associated instruments at Apache Point, New Mexico. Fermilab Director Emeritus John Peoples serves as the Director of SDSS. Important scientific results have already come from the 1999-2000 commissioning phase of the survey; seventeen new high redshift quasars have been discovered, and one of these has the largest redshift ever observed. A new result in early 2000 was the discovery of two "methane dwarfs," objects with masses intermediate between giant planets like Jupiter and the least massive stars. Other new results include the clear detection of gravitational lensing of distant galaxy images by foreground galaxies, the discovery of the most distant quasars, and closer to home, a catalog of asteroids with the potential to affect Earth.

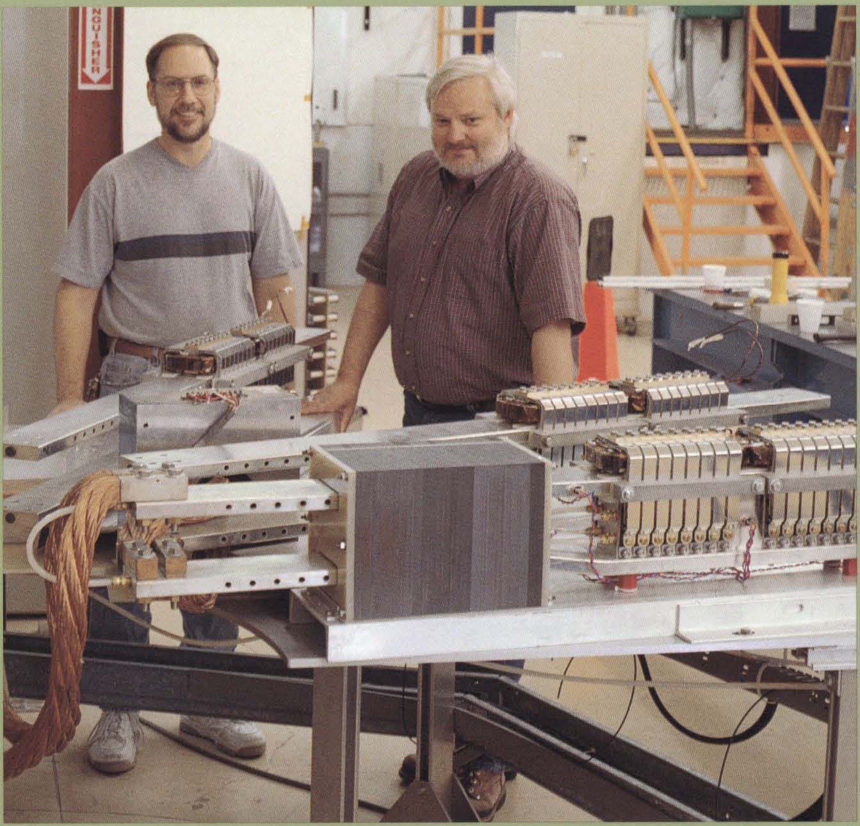
On June 5, 2001, SDSS announced an "Early Data Release" (EDR) consisting of images, spectra and measured parameters obtained during the commissioning phase and since the start of routine observations on April 1, 2001. Fermilab and the Space Telescope Science Institute are providing the websites to distribute the EDR to the astronomical community.

As a member of an international collaboration of 19 countries, Fermilab is also playing a major role in the Pierre Auger Observatory Project, which will explore the properties and mysterious origins of very-high-energy cosmic rays. *(See Separate Section on Pierre Auger Observatory Project.)*

FUTURE ACCELERATORS AND COLLIDERS

While scientists await new discoveries in the upcoming Collider Run II, they must also plan how to advance the field. The stated goal of the U.S. high-energy physics community is to develop a collider that will be at the energy frontier after the LHC starts operating. Many in the community believe that Fermilab is the natural site for such a collider. As the largest U.S. laboratory for particle physics, Fermilab would provide a strong base of talent and infrastructure on which to build new facilities both on and near the present site. Future accelerator and collider concepts currently under study include a 500-1000 GeV electron-positron linear collider, a muon storage ring-based "neutrino factory," and a 175 TeV very large hadron collider.

The electron-positron linear collider option is receiving the most focused effort around the world. Its proponents see it as a natural complement to the LHC in exploring new physics at the TeV mass scale. The ability to build such a collider on or near the Fermilab site and the fact that decisions could be reached relatively soon have convinced the Laboratory to become active in this effort. Fermilab is now a member of the U.S. Next Linear Collider (NLC) collaboration, which includes Stanford Linear Accelerator Center (SLAC) and the Lawrence Berkeley and Lawrence Livermore National Laboratories. The NLC collaboration is formulating a 4-5 year R&D plan that if brought to a successful completion could support the construction of a linear collider. Major components of the Fermilab NLC R&D program include structures fabrication, an engineering test facility for the main linac, accelerator physics, permanent magnets, and analysis of nearby sites. In addition, Fermilab continues its collaboration with DESY, the German high energy physics laboratory near Hamburg, and other institutions on R&D for the "TeV Energy Superconducting Linear Accelerator" (TESLA). Fermilab has contributed critical components for the TESLA Test Facility, used to develop and test new superconducting accelerator technology.



Brad Claypool (left) and Steve Hays work on power supplies for future colliders, which will have power demands of ten or more megawatts.

The muon collider option is an interesting concept, but one that needs a long R&D effort to see if it could lead to a new instrument for exploring physics at high energies. The collaboration analyzing this option encompasses a number of laboratories and universities, with Fermilab and the Brookhaven and Lawrence Berkeley National Laboratories as lead laboratories. The collaboration has recently become convinced that a more modest neutrino

As the largest U.S. laboratory for particle physics, Fermilab would provide a strong base on which to build new facilities

John Konc of Fermilab's Technical Division with an advanced superconducting magnet.

facility, based on a muon storage ring, is an appropriate first step along the path to a muon collider, and the majority of the effort of the collaboration since 1999 has been refocused on a possible neutrino factory. A design study for a proton accelerator for such a facility was completed in January 2001.

The very large hadron collider (VLHC) option, a proton-proton collider with a center-of-mass energy of 175 TeV, would provide a "mass reach" for exploration more than ten times greater than that of the LHC. Fermilab's leadership in developing superconducting magnets and the unique advantages of an Illinois site for such a machine make the Laboratory a natural center for R&D toward a VLHC. Fermilab is collaborating with the Lawrence Berkeley and Brookhaven National Laboratories on a VLHC program focused on superconducting magnet R&D, conceptualization of staging scenarios, and tunneling and geological investigations. Fermilab is currently pursuing R&D on two approaches to reducing the cost of a VLHC, one based on high-field (10-12 Tesla) superconducting magnets, and a second based on low-field (2 Tesla) superconducting magnets. The VLHC collaboration has recently focused on a staged approach, in which a 40 TeV machine is built first, and subsequently upgraded to 175 TeV.

Fermilab is also collaborating with several regional universities that have initiated accelerator R&D efforts utilizing both state and federal support. The Illinois Consortium for Accelerator Research (ICAR) consists of Illinois Institute of Technology, Northern Illinois University, Northwestern University, University of Chicago and University of Illinois, Urbana-Champaign. Supported at $2.5 million per year, the purpose of ICAR is to assist Fermilab with accelerator R&D for future facilities. On March 7, 2001, Speaker of the U.S. House of Representatives Dennis Hastert announced a Congressional appropriation of $4.2 million to establish the Northern Illinois Center for Accelerator and Detector Development (NICADD). The Center is expected to be operational by 2002 at Northern Illinois University's DeKalb campus. NICADD projects envisioned for collaboration with Fermilab include creation of a particle detector research facility, establishment of a separate facility for development of the next generation of linear colliders, and joint operation of the "AZero photoinjector," an experimental particle beamline facility at Fermilab.

During the past year, there have been major planning efforts for the field. Scientists from the U.S. high-energy physics community, including Fermilab, participated in Snowmass 2001, a Summer Study on the Future of Particle Physics. The community also eagerly awaits the report of a DOE/NSF advisory panel on Long Range Planning for U.S. High Energy Physics, due to be published in Fall 2001.

EDUCATION, TRAINING AND FELLOWSHIP PROGRAMS

Fermilab's history of achievement in science education and teacher training programs is a tribute to physicists' love of learning and to students' responsiveness to real-world situations. Spearheaded by Fermilab Director Emeritus and Nobel laureate Leon Lederman, the education program gives special emphasis throughout to strengthening science education for under-represented groups.

Fernanda Garcia (right) and Sabina Aponte of Fermilab's Particle Physics Division inspecting photo multiplier tubes for the MiniBooNE detector.

The Leon M. Lederman Science Education Center, dedicated in 1992, drew attendance in 2000 of over 21,000 students and 7,200 teachers in K-12 education programs. The Center offers some 25 programs: teacher enhancement workshops and institutes, opportunities for research participation, development and distribution of instructional materials, a collection of teachers' resources, Laboratory tours, special events, class field trips, and science shows. In 2000, the Center's education webserver received over 3,000,000 hits. Currently, 79 percent of the Center's funding is provided by Fermilab, and 21 percent comes from other federal, state and private sources.

The homepage of Fermilab's award-winning, redesigned website (http://www.fnal.gov) guides visitors and researchers alike through the Laboratory's various programs and activities.

The Summer Internships in Science and Technology (SIST) program provides summer internships at Fermilab in physics, engineering and computer science to an average of 20 undergraduate students per year from minority groups traditionally underrepresented in the fields of science and engineering. Fermilab has sponsored the SIST program for 30 years. SIST has the distinction of being the oldest operating program of its type in the U.S. and has served as a model for other laboratories and private industry.

URA also provides financial support for graduate courses at Fermilab. Students must devote so much time to participating in experiments at the Laboratory that they often have difficulty taking needed classes at their home institutions.

Fermilab sponsors the Lederman, Peoples and Wilson postdoctoral fellowships at the Laboratory, and participates in a Joint University-Fermilab Doctoral Program in Accelerator Physics. In collaboration with other laboratories and U.S. universities, Fermilab serves as home of the U.S. Particle Accelerator School. The Laboratory also supports university faculty members through a guest scientist program and as visitors to the Theory Group.

ENVIRONMENTAL ACTIVITIES

In addition to its research in high-energy physics, Fermilab has been designated a National Environmental Research Park by DOE. The Laboratory vigilantly oversees restoration and preservation of the site's ecosystems. Over the years, the Laboratory has restored more than a thousand acres of the native tallgrass prairie that once covered the Fermilab site. The prairie is actively managed, including annual prairie burns to help maintain the system's natural cycles. In 1998, Fermilab became a member of Chicago Wilderness, a consortium of

Fermilab has been designated a National Environmental Research Park by the Department of Energy

nearly one hundred public and private landholders in the Chicago area committed to careful and responsible management of the remaining habitat in the region.

In 2000, Fermilab received formal validation from the Illinois Environmental Protection Agency (IEPA) for the Laboratory's efforts to conclude an assessment of identified solid waste management units located onsite. IEPA approved the Laboratory's methods for administrating and monitoring these units. Also in 2000, an aggressive recovery and restoration plan to revitalize previously unusable experimental areas was initiated on the Laboratory site. The continuing work involves disassembly and removal of materials and equipment, followed by a thorough lead decontamination effort. The experimental areas involved are scheduled to be ready for reuse by 2002, primarily for storage of magnet tooling equipment. There was substantial progress in the past year on an EPA-approved program to remediate PCB-contaminated soil at transformer yards located at service buildings around the Tevatron ring; this project will be fully completed in 2002.

Deep tunnel construction, such as that for the NuMI project produces large volumes of sediment-laden groundwater that is pumped to the surface. Solids are then removed, and ultimately the clean water is discharged. By April 2000, it was clear that meeting environmental permit requirements for the amount of total suspended solids in the discharge water was going to be a difficult task. The magnitude of sediment load from the tunnel excavation, as well as the physical characteristics of the sediment particles hindered the effectiveness of sediment control. After considerable analysis, new measures were implemented in June 2001 and have performed well since. The Laboratory fully expects this trend to continue.

Planting trees during "Bring your Daugthers and Sons to Work Day (DASTOW)" at Fermilab.

TECHNOLOGY TRANSFER

While Fermilab is dedicated to basic physics research, the Laboratory is eager to share its science, technology and know-how by working cooperatively with U.S. industry to encourage economic development. Fermilab has unique capabilities in designing and operating accelerators, managing very large cryogenic systems, developing and operating fast electronics, creating hardware architectures and software for massively parallel computing systems and operating industrial-scale applications of superconducting technology. Sometimes advances in these technologies at the Laboratory have applications beyond high-energy physics research, and Fermilab can transfer new technology to industry to foster economic development. Fermilab's Directorate-level Office of Research and Technology Applications (ORTA) facilitates the transfer of technologies developed at the Laboratory.

The Neutron Therapy Facility continues to provide outstanding results in medical benefit to patients worldwide.

ACCELERATORS IN MEDICINE

Between 1976 and 1985, the National Cancer Institute funded clinical trials at Fermilab to explore the effectiveness of fast neutrons versus photon therapy in the management of radioresistant tumors. Over 2,600 patients have received treatment at Fermilab's Neutron Therapy Facility. About 25 percent of these patients reside outside Illinois, including individuals from Haiti, Greece, Pakistan, Canada, Mexico and the Philippines. Since 1995 the facility has been operated under contract with Provena Saint Joseph Hospital of Elgin, Illinois.

Jackie Sullivan receives Micro Current Therapy from Jan Biel at Fermilab's Neutron Therapy Facility.

Beyond the borders of Illinois, the NTF has served as a model for more recently built neutron therapy facilities in Michigan, South Africa, and France. Fermilab also built a 250 MeV proton accelerator for the hospital of Loma Linda University Medical Center in California, which began treating patients in October 1990.

COMMUNITY PROGRAMS

Fermilab's role as a key element of the Illinois High Technology Corridor is complemented by its sponsorship of cultural activities to which the public is invited. Laboratory staff volunteer in supporting an arts series, physics colloquia, films and an art gallery. Fermilab also conducts public tours for visitors and briefings for local citizens on Laboratory initiatives.

LABORATORY DIRECTORS

On March 5, 1999, URA announced the appointment of Michael Witherell as Fermilab's fourth director, effective July 1, 1999. Dr. Witherell succeeded John Peoples Jr., who led the Laboratory from 1989 to 1999. Dr. Peoples continues at Fermilab as a senior scientist and Director of the Sloan Digital Sky Survey. Leon M. Lederman, a 1988 Nobel laureate, directed the Laboratory from 1979 to 1989 and is a member of the URA Board of Trustees. His contributions to science education are known worldwide. Fermilab's founding director, the late Robert R. Wilson, served from 1968 to 1978, and subsequently served as a member of URA's Fermilab Board of Overseers. Dr. Wilson provided continuing guidance for the aesthetics of buildings and grounds, including sculpture that he created.

For further information about Fermilab, visit the Laboratory's website at http://www.fnal.gov.

Visiting students in a QuarkNet Worksho with Robert Wilson's *Mobius Strip* sculptu in the background.


KANSAS
MARQUETTE
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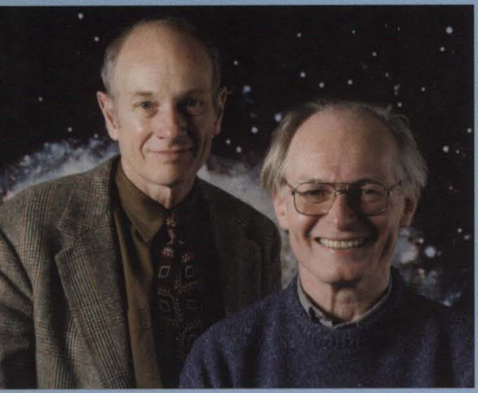
XXL

Pierre Auger Observatory Project



James W. Cronin (left) of the University of Chicago and Alan A. Watson of the University of Leeds are co-leaders of the Pierre Auger Observatory Project.

Ribbon cutting ceremony for the Detector Assembly Building on the Central Campus of the Pierre Auger Observatory in Mendoza Province, Argentina.

COSMIC RAYS ARE FAST-MOVING PARTICLES from space that constantly bombard the earth from all directions. Most of the particles are either electrons or the nuclei of atoms. Of the nuclei, the majority are single protons—the nuclei of hydrogen atoms—but a few are much heavier, ranging up to the nuclei of lead atoms. Cosmic ray particles travel at nearly the speed of light, which means they have very high energy. Some of them, in fact, are the most energetic particles ever observed in nature. To discover the source of cosmic ray particles, scientists measure their energy and their direction as they arrive from space. To measure cosmic ray particles directly requires sending detectors to heights above most of the earth's atmosphere, using high-flying balloons and satellites. However, scientists can also detect cosmic rays indirectly on the surface of the earth by observing the showers of particles they produce in the air, as discovered by French physicist Pierre Auger about 60 years ago.

The Pierre Auger Observatory Project is a broad-based international effort to make a detailed study of the highest energy cosmic rays (about 10^{20} eV, or 100 million times greater than the energy of the protons accelerated by Fermilab's Tevatron). The Project's co-leaders are Dr. James W. Cronin, Professor of Physics, University of Chicago and Dr. Alan A. Watson, Professor of Physics, University of Leeds in the United Kingdom. Thus far, the Pierre Auger collaboration includes over 250 scientists from Argentina, Armenia, Australia, Bolivia, Brazil, China, France, Germany, Greece, Italy, Japan, Mexico, Poland, Russia, Slovenia, United Kingdom, USA and Vietnam. The U.S. collaboration comprises nine universities plus Fermilab, home of the project manager, Dr. Paul Mantsch.

Because the highest-energy cosmic rays are so rare, scientists must cast a huge net to capture even a few. The Pierre Auger Observatory will consist of two giant arrays, each consisting of 1600 particle detector stations spaced 1.5 kilometers apart and covering about 3000 square kilometers, an area about the size of the state of Rhode Island. In order to get a complete view of the heavens as seen from the earth, one array will be located in the northern hemisphere and one in the southern hemisphere. In November 1995, the collaboration selected a site in the Province of Mendoza, Argentina for the southern hemisphere array, and in September 1996 a site in Millard County, Utah for the northern hemisphere array. The total project cost is approximately $100 million.

In a grant to URA on behalf of the U.S. Project participants under Dr. Cronin's leadership, the National Science Foundation and the Department of Energy are providing $7.5 million over four years toward the U.S. share for the construction of the southern hemisphere array. This is planned to be followed by construction of the northern hemisphere array.

URA serves as the sponsoring organization for the U.S. participants, and as such oversees those activities currently funded by the U.S., such as component R&D and production. In the future, URA would have a similar role for the Utah site. In addition, DOE and NSF have designated URA to be the agent representing the U.S. on the Project's international oversight board.

In order to get a complete view of the heavens as seen from the earth, one array would be located in the northern hemisphere and one in the southern hemisphere

In March 1999, an international agreement was signed in Argentina for the organization, management and funding of the Pierre Auger Observatory, and the southern hemisphere site was inaugurated at Malargue in Mendoza Province. In November 2000, construction was completed for the Detector Assembly Building at the Central Campus in Malargue and for the first fluorescence detector building. In December 2000, the project received a gift of $1 million from the Unversity of Chicago for the construction of the Central Campus Office Building. Deployment and commissioning of the "Engineering Array," which consists of forty surface detector stations and a fluorescence detector telescope unit, took place during 2000-2001. Once experience has been gained with the engineering array, construction of the entire southern hemisphere array will begin.

Surface detector tanks in the Assembly Building being prepared for the Engineering Array.

Future URA Enterprises

URA has a broad charter for the management of research and educational activities in the natural sciences. The Corporation has been engaged in long-range planning to explore potential new management responsibilities that would be of value to the university research community. As part of this planning, URA has been considering bids on management contracts for selected national research centers and facilities that serve a broad base of national and international users.

History 1965 - 2000

THE CREATION OF URA MARKED A MILESTONE in government-university cooperation for the management of federal laboratories. Until 1965, individual universities and regional consortia had built and operated facilities under federal sponsorship. It was the unique character of particle physics research—which often involved collaborations among scientists from many institutions—that created the need to establish a truly national management organization. The federal government consulted with the National Academy of Sciences on how to accomplish this goal. The President of the Academy then convened the presidents of the U.S. universities engaged in particle physics, to consider management options for national facilities. Following that meeting, 25 attendees agreed to form a consortium leading to the incorporation of URA.

Robert R. Wilson and Glenn T. Seaborg at the groundbreaking for Fermilab in 1968.

This concept of fully national, and now increasingly international, cooperative efforts between the federal government and research universities was developed to address the needs of many fields of science. Since 1967 URA has been contractor to the Department of Energy and its predecessor agencies for the design, construction, management, and operation of Fermilab. URA's success in building and operating Fermilab led to its selection as contractor for the nation's next major particle accelerator, the SSC. After the project was canceled in 1993, URA managers and staff assisted with the termination activities, which were essentially concluded by the end of 1996.

Currently, the Fermilab program and its associated scientific and technological enterprises, and U.S. participation in the Pierre Auger Observatory Project represent the core of URA's mission. As appropriate opportunities arise, the corporation will consider submitting proposals to the federal government, or elsewhere, for the management and operation of other facilities and programs in science and engineering.

The creation of URA marked a milestone in government-university cooperation for the management of federal laboratories.

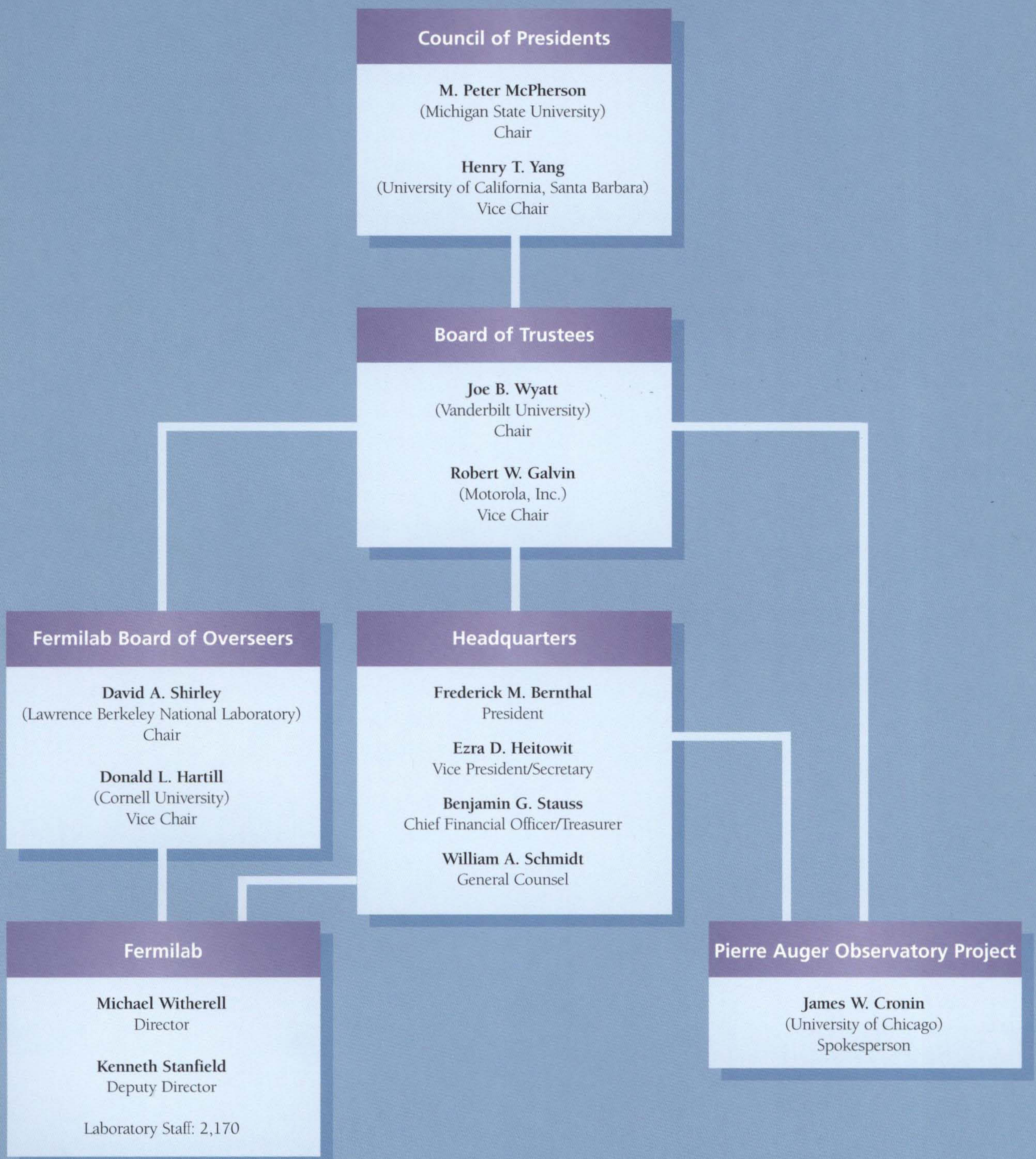
Council of Presidents

University of Alabama-Tuscaloosa	Andrew Sorensen
Arizona State University	Lattie F. Coor
University of Arizona	Peter Likens
Boston University	Jon Westling
Brown University	Ruth J. Simmons
California Institute of Technology	David Baltimore
University of California-Berkeley	Robert M. Berdahl
University of California-Davis	Larry N. Vanderhoef
University of California-Irvine	Ralph J. Cicerone
University of California-Los Angeles	Albert Carnesale
University of California-Riverside	Raymond L. Orbach
University of California-San Diego	Robert C. Dynes
University of California-Santa Barbara	Henry T. Yang
Carnegie Mellon University	Jared Cohon
Case Western Reserve University	James W. Wagner
University of Chicago	Don Michael Randel
University of Colorado-Boulder	Richard L. Byyny
Columbia University	George E. Rupp
Cornell University	Hunter R. Rawlings, III
Duke University	Nannerl Overholser Keohane
Florida State University	H. Talbot D'Alemberte
University of Florida	Charles E. Young
Harvard University	Lawrence H. Summers
University of Hawaii-Manoa	Kenneth P. Mortimer
University of Houston	Arthur K. Smith
University of Illinois-Champaign/Urbana	Nancy E. Cantor
Indiana University	Myles Brand
Iowa State University	Gregory L. Geoffroy
University of Iowa	Mary Sue Coleman
Johns Hopkins University	William R. Brody
Kansas State University	Jon Wefald
Louisiana State University	Mark A. Emmert
McGill University	Bernard Shapiro
University of Maryland-College Park	C. D. Mote, Jr.
Massachusetts Institute of Technology	Charles M. Vest
University of Massachusetts-Amherst	David K. Scott
Michigan State University	M. Peter McPherson
University of Michigan	Lee C. Bollinger
University of Minnesota	Mark G. Yudof
University of Nebraska-Lincoln	Harvey Perlman
New Mexico State University	G. Jay Gogue
University of New Mexico	William C. Gordon
SUNY - Buffalo	William R. Greiner
SUNY - Stony Brook	Shirley Strum Kenny
University of North Carolina-Chapel Hill	James C. Moeser
University of North Texas	Norval F. Pohl
Northeastern University	Richard M. Freeland
Northern Illinois University	John G. Peters
Northwestern University	Henry S. Bienen
University of Notre Dame	Edward A. Malloy, C.S.C.
Ohio State University	William E. Kirwan
University of Oklahoma	David L. Boren
University of Oregon	Dave Frohnmayer
Pennsylvania State University	Graham B. Spanier
University of Pennsylvania	Judith Rodin
University of Pisa	Luciano Modica
University of Pittsburgh	Mark Nordenberg
Princeton University	Shirley M. Caldwell Tilghman
Purdue University	Martin C. Jischke
Rice University	Malcolm Gillis
University of Rochester	Thomas Jackson
Rockefeller University	Arnold J. Levine
Rutgers, The State University of New Jersey	Francis L. Lawrence
University of South Carolina	John M. Palms
Stanford University	John L. Hennessy
Syracuse University	Kenneth A. Shaw
University of Tennessee-Knoxville	Emerson H. Fly
Texas A&M University	Ray M. Bowen
Texas Tech University	Donald R. Haragan
University of Texas-Arlington	Robert E. Witt
University of Texas-Austin	Larry R. Faulkner
University of Texas-Dallas	Franklyn G. Jenifer
University of Toronto	Robert J. Birgeneau
Tufts University	Lawrence S. Bacow
Tulane University	Scott S. Cowen
University of Utah	J. Bernard Machen
Vanderbilt University	E. Gordon Gee
Virginia Polytechnic Institute	Charles W. Steger
University of Virginia	John T. Casteen, III
Waseda University	Takayasu Okushima
Washington University	Mark S. Wrighton
University of Washington	Richard L. McCormick
Wayne State University	Irvin D. Reid
College of William and Mary	Timothy J. Sullivan
University of Wisconsin-Madison	John D. Wiley
Yale University	Richard C. Levin

Associate Members

Prairie View University	Charles A. Hines
San Francisco State University	Robert A. Corrigan
Southern Methodist University	R. Gerald Turner

Universities Research Association, Inc. 2001 Organization Chart



Corporate Structure

Membership and Governance

As a non-profit corporation, URA acts under the direction of its governing body, the Council of Presidents of its 89 member universities. The Council is analogous to the shareholders of a public corporation. A Board of Trustees, elected by the Council, has the fiduciary responsibilities for the corporation and deals with corporate policy and planning issues. The Trustees appoint boards of overseers for each URA research enterprise. The headquarters office of URA in Washington, D.C. coordinates the activities of the Council and boards, and is responsible for oversight and governance of Fermilab and for corporate relations with the federal government, industry, academe, and the general public. The Internal Audit Manager for Fermilab reports to the URA Headquarters Office.

The Fermilab Director is selected by the Board of Trustees with the approval of DOE. Daily operations are coordinated directly between Laboratory management and the DOE Chicago Operations Office or DOE headquarters. The total number of URA employees at corporate headquarters and at Fermilab is now about 2,180.

URA member universities are divided among seven geographic regions within the United States to ensure that the boards reflect the organization's national character. URA has expanded these regions to include its international members. The Council of Presidents elects one Trustee from each of the seven regions; each Regional Trustee is president or equivalent chief executive officer of a member institution in the region. There are up to nine At-Large Trustees. Similarly, there are seven regional members and up to eleven at-large members of a board of overseers.

URA board members over the years have included university presidents, chief corporate executive officers, Nobel laureates, and directors of other major research laboratories. Regional group secretaries, who are faculty members at URA member universities, help to identify candidates for election to the boards of overseers.

In lieu of annual dues, URA may assess its member universities as special needs arise. Since the formation of the corporation in 1965, assessments have totaled $30,000 per member. Newly elected members are assessed the amount of the most recent prior assessment.

Headquarters Office

Corporate officers include leaders of the URA governing bodies (Council of Presidents and Board of Trustees) and executive officers at URA headquarters in Washington, D.C. Headquarters officers are the President, Vice President/Secretary, Chief Financial Officer/Treasurer, and General Counsel.

Regional Group Secretaries

Broken Symmetry towers 50 feet above the Lab's west entrance. Robert Wilson designed the 212-ton structure, which was built in the Lab's machine shop. Some of the steel came from the decommissioned *USS Princeton*.

2001 URA Board of Trustees

2001-2002 Fermilab Board of Overseers

REGIONAL OVERSEERS

Region		Term Expires
1	Benjamin Shen, Professor University of California, Riverside	2003
2	Gregory Snow, Associate Professor University of Nebraska, Lincoln	2004
3	Marjorie Corcoran, Professor Rice University	2004
4	Melvyn Shochet, Professor University of Chicago	2002
5	Thomas Weiler, Professor Vanderbilt University	2004
6	Donald Hartill, Professor Cornell University	2004
7	Jerome Friedman, Professor Massachusetts Institute of Technology	2002

OVERSEERS AT-LARGE

	Term Expires
Jonathan Bagger, Professor Johns Hopkins University	2003
Arden Bement, Head School of Nuclear Engineering Purdue University	2004
John Boright, Executive Director Office of International Affairs National Academy of Sciences	2003
Mark Bregman, CEO Air Media	2002
France Cordova, Vice Chancellor, Research University of California, Santa Barbara	2003
Harold Forsen, Foreign Secretary National Academy of Engineering	2002
Paul Grannis, Professor State University of New York-Stony Brook	2004
Peter Koehler, Professor University of Pittsburgh	2003
Allen Sessoms, Visiting Scholar John F. Kennedy School of Government, Harvard University	2002
David Shirley, Director Emeritus Lawrence Berkeley National Laboratory	2003
Jill Wittels, Vice President, Business Development L-3 Communications	2002

FERMILAB BOARD OF OVERSEERS ORGANIZATION

CHAIR
David Shirley

VICE CHAIR
Donald Hartill

EXECUTIVE COMMITTEE
David Shirley, Chair
Jonathan Bagger
Marjorie Corcoran
Donald Hartill
Peter Koehler
Jill Wittels

ADMINISTRATIVE COMMITTEE
Jill Wittels, Chair
Arden Bement
Mark Bregman
Peter Koehler
Allen Sessoms

AUDIT COMMITTEE
Peter Koehler, Chair
Arden Bement
Jill Wittels

ENVIRONMENT, SAFETY AND HEALTH COMMITTEE
Marjorie Corcoran, Chair
John Boright
Harold Forsen
David Shirley
Gregory Snow

NOMINATING COMMITTEE
Jonathan Bagger, Chair
France Cordova
Paul Grannis

PHYSICS COMMITTEE
Donald Hartill, Chair
Jonathan Bagger
France Cordova
Jerome Friedman
Paul Grannis
Benjamin Shen
Melvyn Shochet
Thomas Weiler

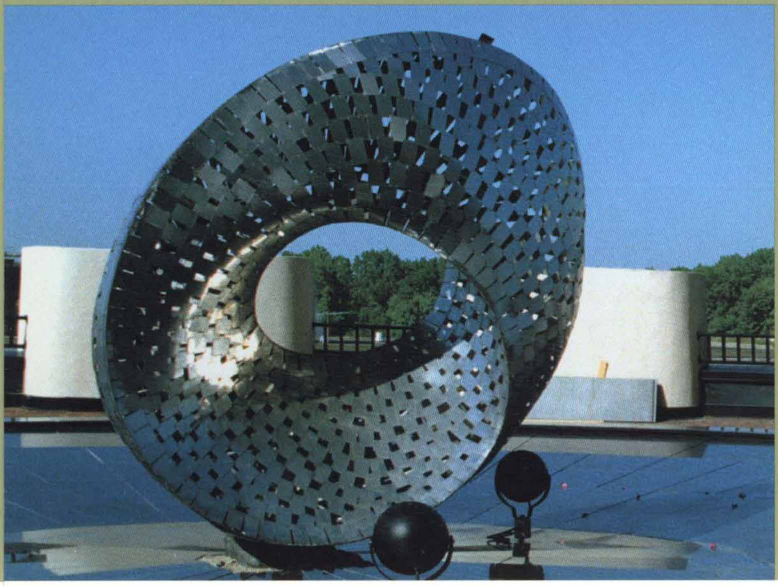
External Committees

URA VISITING COMMITTEE FOR FERMILAB

	Term Expires
William Marciano, Chair Brookhaven National Laboratory	2001
David Burke SLAC	2001
Peter Fisher Massachusetts Institute of Technology	2001
Lorenzo Foa CERN	2001
Michael Harrison Brookhaven National Laboratory	2002
Stuart Henderson Cornell University	2002
Dan McCammon University of Wisconsin-Madison	2001
James Siegrist Lawrence Berkeley National Laboratory	2002

FROM THE FERMILAB BOARD OF OVERSEERS

Jonathan Bagger Johns Hopkins University	2003
Donald Hartill Cornell University	2002



FERMILAB PHYSICS ADVISORY COMMITTEE

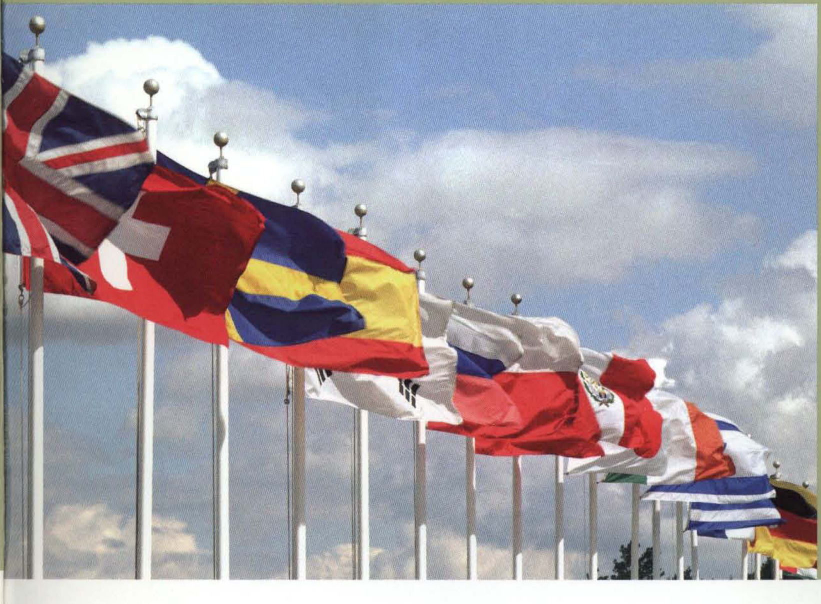
	Term Expires
Peter Meyers, Chair Princeton University	2002
James Alexander Cornell University	2005
Giorgio Bellettini University of Pisa	2001
Robert Cousins University of California, Los Angeles	2003
Adam Falk Johns Hopkins University	2002
Nicholas Hadley University of Maryland, College Park	2001
Andrew Lankford University of California, Irvine	2005
Joseph Lykken Fermilab	2004
Frank Merritt University of Chicago	2001
Shoji Nagamiya KEK	2002
Michael Peskin SLAC	2003
Ronald Poling University of Minnesota	2003
Jeffrey Richman University of California, Santa Barbara	2001
Natalie Roe Lawrence Berkeley Laboratory	2004
Heidi Schellman Northwestern University	2005
Paul Tipton University of Rochester	2005
Tejinder Virdee CERN	2004
Taiji Yamanouchi Secretary (Fermilab)	

Robert Wilson did the welding himself for *Mobius Strip*, mounted atop Fermilab's Ramsey Auditorium. Wilson welded 3″x 5″ pieces of stainless steel to a tubular form eight feet in diameter.

Finances

UNIVERSITIES RESEARCH ASSOCIATION, INC.
OPERATING STATEMENT
YEAR ENDED SEPTEMBER 30, 2000

Total Revenue	**$ 310,720,752**
EXPENSES:	
Salaries, wages and benefits	$ 147,113,241
Subcontracts and other purchased services	40,062,730
Materials and supplies	21,631,858
Travel, relocation and other employee allowances	6,114,516
Electric power	13,603,176
Inventory usage	4,712,315
Fermi National Accelerator Laboratory support	407,256
Scholarships	133,500
Other	623,865
Total Operating Expenses	**$ 234,402,457**
Cost of property, plant and equipment constructed for DOE	**$ 75,573,935**
Total Expenses	**$ 309,976,392**



Flags of nations representing Fermilab's international user community fly in front of Wilson Hall. High-energy physics has long been a leader in international scientific collaboration. Future progress will require even greater international cooperation to build accelerators and detectors to reach new energy frontiers.

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Fermilab Visual Media Serv

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Website: www.ura-hq.org

Robert L Atkinson

M.S. 109