

FermiNews

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NuMI Gets Rolling

With the first installment of DOE funds, NuMI moves from proposal to bona fide project.

by Sharon Butler, Office of Public Affairs

Neutrinos, those antisocial particles that refuse to interact with anything, are streaming all around—and through—us, but we know very little about them.

That may soon change, however. On October 13, President Clinton signed the appropriations bill for the U.S. Department of Energy, allocating \$5.5 million in fiscal year

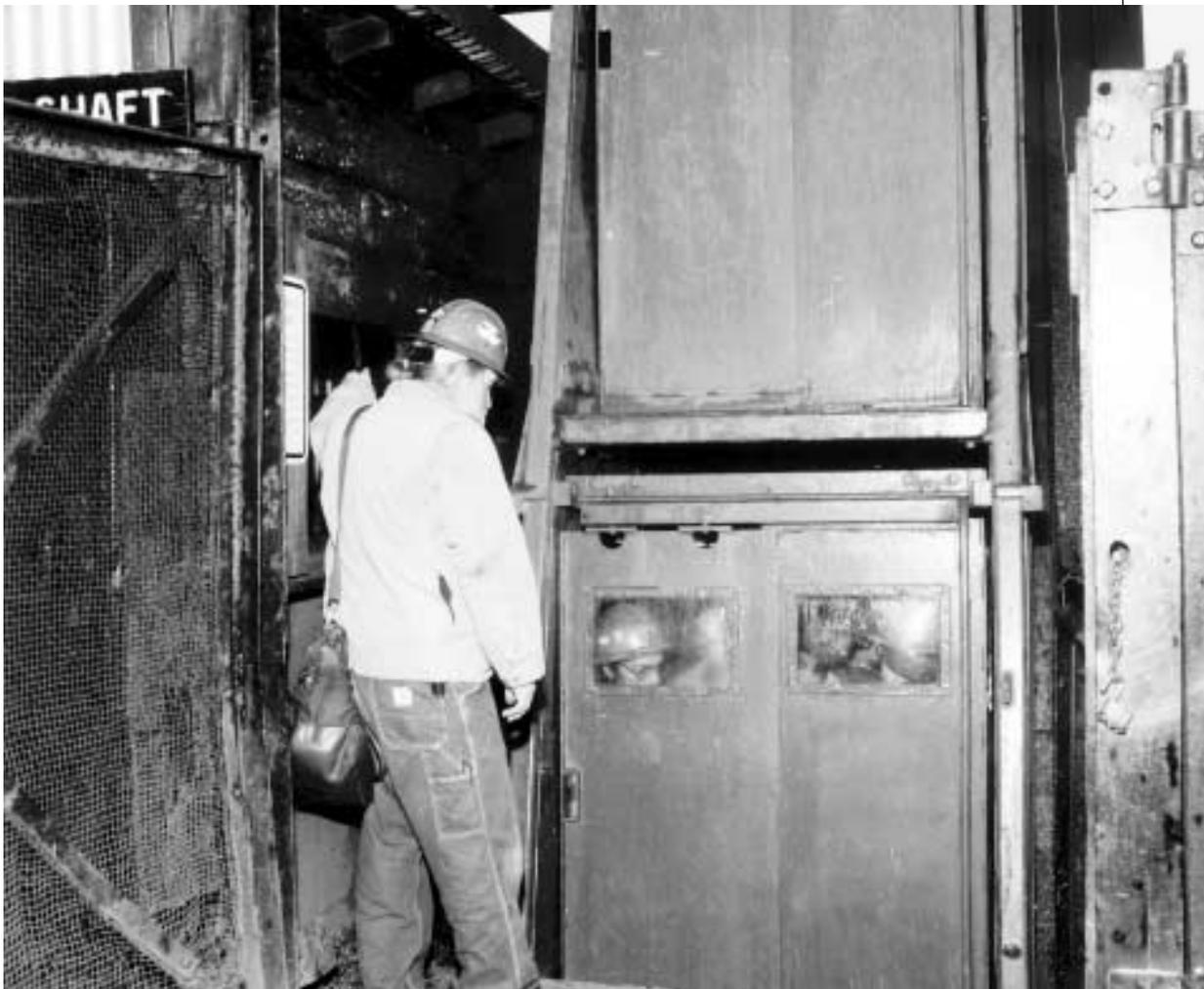
1998 for Fermilab's Neutrinos at the Main Injector collaboration and making NuMI no longer just a proposal but a bona fide project. If funding holds up over the next several years, experimenters hope to begin taking data sometime in 2002.

And then perhaps we'll know whether neutrinos have mass.

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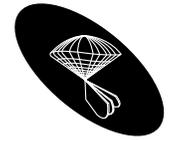
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Lab crew descend an old mine shaft to an experimental hall 2,400 feet below ground in Soudan, Minnesota.

Mapping the Sky

Fermilab reviews the status of the Laboratory's contributions to the Sloan Digital Sky Survey.



SLOAN DIGITAL SKY SURVEY

by Sharon Butler, Office of Public Affairs

Attempts to map the sky are as old as the hills, but the one that presaged modern-day efforts was the Carte du Ciel.

Formally organized in 1887, the Carte du Ciel project was to involve 17 observatories scattered throughout the world, all with identical telescopes consisting of standard refractors with 13-inch-diameter lenses and 11-foot focal lengths. Astronomers of the day intended to produce both a small-scale photographic atlas of the sky and a catalog of stars, with their positions and brightnesses. Scheduled to be finished in five years, a completed Carte du Ciel never materialized.

Still, the Carte du Ciel was the first attempt to chart the universe on such a scale. And it set a precedent for later surveys, like the map of the northern hemisphere done by the Palomar Observatory in the 1950s.

Enter now the Sloan Digital Sky Survey, a collaborative effort of eight universities and research institutions that promises to set a new standard.

For, as speakers at a recent director's review meeting at Fermilab emphasized, this new Survey will have no parallel anywhere in the world.

One quarter of the sky

When completed, the Survey will systematically chart one quadrant of the entire sky to an unprecedented level of resolution, producing a detailed map and determining the positions and absolute brightnesses of more than 100 million celestial objects.

The Survey will also measure the distances to a million of the nearest galaxies, providing a three-dimensional picture of the universe through a volume 100 times larger than any explored to date. The project will also record the distances to 100,000 quasars, among the most distant objects known, giving a unique look at the distribution of matter at the edge of the visible universe.

Fermilab's contributions

The review meeting, held on November 3, was a chance to brief not only members of Fermilab but also Jim Crocker, the Survey's newly appointed associate director for program management. Crocker most recently served as program manager for the European Southern Observatory but perhaps is best known for proposing the method that succeeded in correcting the initial blurry vision of the Hubble Space Telescope.

The meeting was also the first time that Fermilab staff working on the project had assembled in one room for a major review. People all across the Laboratory are designing, constructing and assembling bits and pieces of the 2.5-meter telescope destined for Apache Point Observatory, in New Mexico.

■ Under Don Petravick, head of the High Performance and Parallel Computing Department, staff from the Computing

The 2.5-meter telescope for the Sloan Digital Sky Survey at Apache Point Observatory in New Mexico.



Photo by Fred Ullrich



Division have constructed the data acquisition system for processing the 10 to 20 terabytes of data the Survey is expected to accumulate. This system will take the photons of light from celestial objects after they have been converted into digitized signals, or pixels, and record them on magnetic tapes.

■ Under astronomers Steve Kent and Brian Yanny, of the Experimental Astrophysics Group, staff from Fermilab's Computing Division and other institutions in the collaboration are developing the software for offline analysis. This software feeds the digitized information from the magnetic tapes into data-processing "pipelines," which will convert the pixels into a form astronomers can use to identify and measure the properties of stars, galaxies and quasars. For example, the monitor telescope pipeline, currently under the direction of astronomer Douglas Tucker, will analyze the data from the monitor telescope at Apache Point Observatory to produce a record of changes in the transparency of the atmosphere. Using these data, astronomers will be able to accurately calibrate an object's brightness, as measured by the main telescope.

■ With overall coordination of task manager Bill Boroski, of the Technical Division, members of Fermilab's Beams, Particle Physics and Technical divisions are creating several systems for use with the spectrograph, a device that will record the spectrum of light to analyze the distance, composition and age of each celestial object. One such system is the fiber mapper, associated with huge aluminum plates that will be inserted at the focal plane of the telescope. About the size of a large pizza pan, each plate is drilled with 640 holes corresponding to the positions of selected galaxies, quasars or stars in the sky. Into the holes, astronomers will fit optical fiber cables to record the light. The fiber mapper is the bookkeeper, letting the astronomer know which cable went into which hole, corresponding to which celestial object. Fermilab staff are also building the controls and interlocks that will drive the telescope's motors, precisely controlling both the speed and direction of the telescope as required for each long sweep of the sky.

Milestones

The project will hit several important milestones in the next several months. "We've reached a stage where, all of a sudden, people are bumping into each other," said Kent.



Photo by Reidar Hahn

One milestone has just passed. Princeton University, one of the Survey's collaborators, delivered to the observatory the imaging camera—the most complex camera ever built. In the next month, Fermilab staff will hook up the data acquisition system.

"We'll find out if this thing really works," said Kent. Simulations were done, but "experience shows that simulations never test all of the possible features in the final system." Moreover, because the algorithms used to select objects for spectroscopy need to be the same from the beginning to the end of the Survey, the system has to work soon after the telescope is running. "Fixes can't be made as you go along," Kent said.

In spring, the telescope should have what astronomers call "first light"—when the optics are installed and light passes through to make the first focused image. Soon thereafter, Fermilab's controls and interlocks system for positioning and moving the telescope will be connected and the software tested and adjusted.

Excitement is growing, then, as instruments begin to assemble on the mountaintop in New Mexico to construct at last the long-awaited *carte du ciel*.

Now is when, Kent acknowledged, "morale goes up and, as the systems are put to the test of fire, panic sets in." ■

Astronomer Allyn Smith, from the University of Michigan, examines the monitor telescope for measuring changes in atmospheric conditions.



Photo by Reidar Hahn

A tape cartridge to hold the data for about half a night's observations.

Bromley Speaks on Federal Role in U.S. Research

At a U.S. Capitol news conference on October 22, physicist D. Allan Bromley, president of the American Physical Society, joined the presidents of other scientific societies to speak about the role of science research in the United States. The occasion was the announcement of the National Research Investment Act of 1998, also known as the Gramm-Lieberman Bill, for the two senators who co-sponsored the legislation. The bill calls for doubling federal research spending in basic scientific research over the next 10 years. Bromley's remarks follow:

"Senator Gramm, Senator Lieberman, colleagues, members of the press, ladies and gentlemen, this is indeed an historic occasion. Science has brought us to the threshold of a golden era. We have a robot exploring Mars sending the pictures back live to our television sets and computers. We have the knowledge of the world at our fingertips. Our nation is more secure and more prosperous than it has ever been.

"My colleagues and I, the leaders of 105 professional societies, representing more than 3 million engineers, mathematicians and scientists, have gathered here today to renew our commitment to the investment in science and technology, a commitment that has made America the envy of the world. For decades, whenever our nation has called for assistance—to fight disease, to secure our shores or to improve our economic well being—America's scientists have responded.

"Today, with no enemy threatening our shores, with our nation's economy continuing to experience unprecedented growth and with more and more Americans living beyond the Biblical four score years, it is easy to be lulled into a false sense of security that our future is firm and assured. But the truth is that our extraordinary technological progress of recent years, which has produced countless benefits for our people, has had its roots in the research investments we made as many as three decades ago. Today, the rate of federal investment in



Photo by Bob Palmer

"...Whenever our nation has called for assistance—to fight disease, to secure our shores or to improve our economic well being—America's scientists have responded."



research as a fraction of the gross domestic product has fallen to half of what it was thirty years ago.

"At the same time, our taxation, financial and regulatory policies have offered American industry no incentive to reverse its current policy of cutting back on the investments in long-term, high-risk research that were once prevalent. Today, the vast majority of that kind of research is carried out with federal funding in our universities and national laboratories. In fact, a recent survey has shown that almost three quarters of the citations listed in U.S.

industrial patent applications now reference publicly supported research in our universities.

"Economists tell us that since the end of World War II, technology has produced more than one half of our nation's economic growth. Today, technology is widely credited with sustaining the six years of strong economic growth and increasing productivity, which have led to the low rates of inflation and unemployment that we now enjoy.

"Economists also tell us that the social rate of return of our investments in basic research—the underpinning of technology—is extremely high. Some believe that it exceeds 50 percent; few believe that it is lower than 20 percent.

"So today, we, the leaders of our nation's major science, engineering and mathematics societies have gathered here to issue a "Unified Statement" calling for a doubling of the federal investment in research over the next decade. We applaud Senator Gramm and Senator Lieberman for taking the lead in co-sponsoring legislation that strives to achieve this goal in the area of civilian research.

"We all recognize that turning those legislative words into a reality will not be easy, particularly when budgets are constrained and many worthy programs are competing for scarce federal dollars. But all of us also recognize that without sustained economic growth, driven by technological innovation and seeded by the fruits of long-term research, the balanced budget agreement recently adopted has little chance of becoming a sustainable reality. It is for this reason that we have gathered here at the Capitol today.

"Finally, I believe that I speak on behalf of all of my colleagues when I say that in the future our nation's scientists, engineers and mathematicians will do their utmost to maximize the return on the federal research investment, just as they have done in the past.

"I thank you all for coming and for this opportunity to speak on this important matter." ■

Collision Imminent Near Rome

Frascati physicists reach milestone.

by Judy Jackson, Office of Public Affairs

Matter is about to meet antimatter at a rendezvous in the Roman hills.

Late in the evening of October 25, physicists at Italy's Laboratori Nazionali di Frascati, near Rome, reached a major milestone in the commissioning of the laboratory's new electron-positron collider, DAΦNE.

"During a shift started at 2 p.m., the 510-MeV electron beam has been transported to the injection point of the electron Main Ring,"

wrote project leader Gaetano Vignola in a report to Frascati's director Paulo Laurelli.

"With the rf cavity off, it was possible to keep the beam inside the ring for about 0.3 milliseconds, which is the maximum value allowed by the energy loss due to the emission of synchrotron radiation and the aperture of the vacuum chamber."

In a congratulatory message to Laurelli, Fermilab Director John Peoples wrote that "the next few months should be very exciting at Frascati."

Indeed they should. By mid-November, Frascati physicists hope to begin accelerating beams of positrons, the antimatter counterparts of electrons, in a separate ring. In the next year, they plan to bring the electrons and positrons together in collisions at the world-record-breaking design luminosity of 10^{32} cm²/sec. ("Inverse centimeters squared per second" are the units of initial peak luminosity in a collider; they correlate with the number of particle collisions that occur.)

Physicists will use the DAΦNE collider to study the matter-antimatter asymmetry called CP violation in the decay of neutral K mesons, in experiments complementary to those at Fermilab's KTeV fixed-target experiment. DAΦNE will produce copious quantities of phi (Φ) mesons, which decay to kaons.

"DAΦNE will produce lots of phi mesons and in very clean conditions," said KTeV spokesman and University of Chicago physicist Bruce Winstein. "The phi decays to a two-particle coherent superposition of K-long and K-short, allowing many beautiful and precise tests of CP and CPT symmetries. The KLOE group will be making these tests and measurements in a way that has only been dreamed about up until now. Those of us attempting similar studies here at Fermilab eagerly await the imminent commencement of this new program."

The connection between Frascati and Fermilab is a strong one. In 1979, for example, Frascati physicist Paolo Giromini was the third collaborator ("after Alvin Tollestrup and Hans Jensen") to join Fermilab's CDF collaboration. Frascati scientists now number 16 among CDF's 450 collaborators, and Frascati physicists and technicians built many critical parts of the CDF detector.

Giromini takes a strong personal interest in his colleagues' achievements at DAΦNE.

"I have a wager with Vignola," he said. "He bet me that they would achieve the design luminosity of 10^{32} by Christmas of next year. The winner gets to take any number of friends to dinner at the loser's expense."

To dinner where?

"In Rome, of course," Giromini said. ■



Fisheye view of the DAΦNE hall after completion of construction in August 1997.

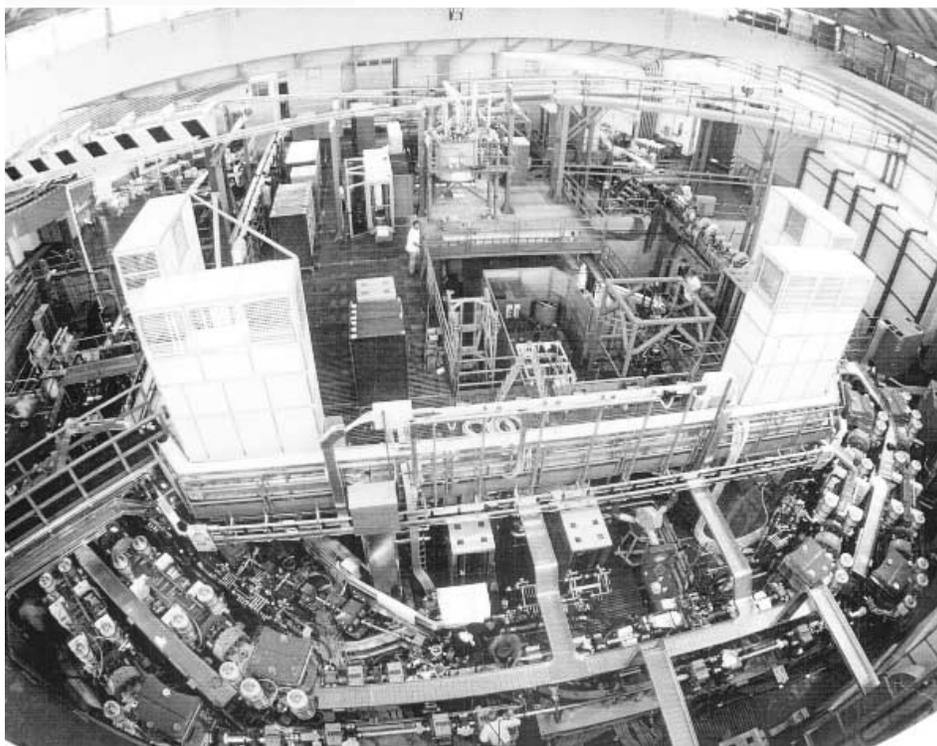


Photo courtesy of Laboratori Nazionali di Frascati

“I Was a Flack for the Top Quark”

When former *Washington Post* reporter Don Sena came to work in Fermilab's Office of Public Affairs in the summer of 1995, he didn't know a quark from a hole in the ground. His assignments soon took him into a hole in the ground—the Tevatron particle accelerator—to learn first-hand the workings of the science of high-energy physics so that he could help Fermilab explain its research to the rest of the world. Soon he was tossing off terms like “lepton,” “charmonium” and “CP violation” as though he had been speaking physics all his life. Last week, Sena returned to journalism, leaving behind these parting thoughts on the art of science communication.

Photo by Reidar Hahn

Don Sena, former assistant head of public affairs at Fermilab.

by Donald Sena, Office of Public Affairs

The best lesson I've ever received about clichés wasn't in my college journalism classes—it was on the Fermilab basketball court.

As I squared up to guard one of the nation's preeminent astrophysicists in a game, I got too close to him, thinking he wasn't going to get around me. However, a flawless crossover move sent me moving one way while he slid the other for a clean lay-up.

So much for the notion of nerdy physicists in white lab coats.

But the cliché-busting didn't end there. At the world's highest-energy particle accelerator, I encountered physicists battling office politics, experimenters with a passion for birdwatching, project managers juggling busy family lives and even a scientific collaboration with a resident rock and roll band.

To those who make Fermilab and the physical sciences a part of their daily lives, these activities are not surprising. However, to some on the “outside,” the stereotype of a scientist is all they have to draw upon. When it comes to research, the layman is even more at a loss. But the evidence, both anecdotal and statistical, tells us that laymen—who pay for basic research with their taxes—have a thirst for science; to the volunteers at Fermilab's recent Open House, this was more than evident. Yet a gap remains, a disconnect between scientist and layman that allows the clichés to persist and the funding to fluctuate. Fortunately, a simple

remedy exists—a bridge, if you will: science communication.

Communication, whether speech, writing or images, helps people understand the benefit behind the science and the passion behind the scientist. True, particle physics is complicated, but people are willing to put in the effort and time to learn. A physicist may have to explain a concept two or three times to an audience of ninth graders or work with a newspaper reporter until the scribe can write about CP violation in simple terms, but the end result is often a nugget of enlightenment and a dash of passion for the physical laws. This understanding brings those on the outside closer to Fermilab's sophisticated work, while opening people's imaginations and expanding their knowledge.

Show me the money

If the wonderment doesn't grab you, how about the money?

The U.S. federal budget is broken down into two parts: entitlements and discretionary spending. During the Kennedy Administration, the entitlements, or mandatory spending portion, totaled only 17 percent of the budget, leaving the rest for discretionary spending. Now, entitlements occupy more than 65 percent of the budget. Of the remaining 35 percent, about half goes to defense spending, leaving only about 17 percent for the rest of the government, including science, education, infrastructure and other federal programs.



June 1997: James White, from the Texas A&M University, escorts Rep. Joe Barton (R-Tx.) through the DZero detector, as Sena strains to follow the action from the background.



September 1995: Martha Krebs, head of DOE's Office of Energy Research, with Fermilab physicist Steve Holmes and others in the prairie during Fermilab's 1995 on-site review. Sena, in background, takes notes.



April 1997: Sena with Kamal Seth, of Northwestern University.

Government representatives who support science, from senators to aldermen, are practically begging scientists to get out of their experiment halls and share their work with others. These representatives generally think science is good for the nation, but they need to convince their constituents that basic research deserves funding. As one congressman said to me last year, "How can I convince the farmer in Indiana that basic research is necessary?"

At every political/science forum I attended in the past two years, the government speakers urged physicists to explain what they do and why it is important. Those representatives need the support of their constituencies to keep funding science. Money for basic science once flowed with little impediment. But the present economic forces don't allow that luxury anymore. As the discretionary budget continues to shrink, the competition for that small slice continues to grow.

Getting the word out

Communication can take many forms. For some of us, it means standing in the background. By following physicists around, asking the same question four different ways, sending frantic e-mails for last-second explanations and observing the events at the Lab, I was able to immerse myself in the inner workings, filter out the jargon and write simply about complicated topics. Mostly the words filled the pages of *FermiNews*, which is read by

school teachers, congressmen, reporters, scientists and my mother, who was quick to point out when I didn't explain the science sufficiently. These stories set out to record, inch by inch, the daily grind at the Laboratory along with the lofty goals—as we attempted to shed light on the personalities as well as the research.

Although the science community is moving in the right direction with respect to communication, much work remains. For example, the Neutrinos at the Main Injector project will challenge the entire Laboratory's outreach capability. A beam of pure muon neutrinos speeding underground from Illinois to Minnesota will surely raise the eyebrows of more than just one Wisconsin dairy farmer. But open and informed communication about neutrinos and their elusive properties will show people the benefits of this research and ease our neighbors' concerns. If even a few people move across the bridge to understanding Fermilab's purpose, then the communication is worth the time and effort. Scientists addressing a classroom or city council meeting, judging at a science fair, giving a tour of the Lab or talking to reporters about their work also help people move across that bridge.

And maybe sometime, somewhere, someone will give a physicist the proper respect—especially when he dribbles into the front court to set up the offense. ■



April 1997: Kamal Seth (left) and Jack Gibbons (center), director of the Executive Branch's Office of Science and Technology Policy, walk with Fermilab Director John Peoples in the Main Injector tunnel. Reporter Sena hustles to keep up.

NuMI

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COSMOS and MINOS

According to Gina Rameika, project manager for NuMI, the \$5.5 million will pay for engineering and design work on the 1.2-kilometer tunnel that will house the NuMI beamline.

Two experiments are planned for this new beamline. Both are designed to test whether neutrinos oscillate—or change from one kind, or flavor, to another—and hence have mass.

One is called the short-baseline experiment, “short” because the distance from the source of neutrinos to the proposed detector, COSMOS, is only about one kilometer. Experimenters will direct a nearly pure beam of muon neutrinos at a target and look for oscillation between the muon and the electron neutrinos. These are the neutrinos that some physicists believe may account for some of the dark matter, the bulk of matter in the universe that astronomers are unable to see but know exists.

The other experiment is called the long-baseline experiment, “long” because the target is 730 kilometers away, in a former iron mine in Soudan, Minnesota. The Soudan mine is now an underground state park run by the Minnesota Department of Natural Resources. It also houses a giant one-kiloton detector (called Soudan 2), which has been used to search for evidence of proton decay and now is involved in studies of atmospheric neutrinos.

For this experiment, two very similar MINOS detectors will be used, one placed at the end of the beamline on the Fermilab property and a larger one in a proposed hall in the Soudan mine. Experimenters will compare the properties of the neutrinos as they leave the Fermilab site and when they arrive in Soudan, counting at each site the number of electron, muon and tau neutrinos. If electron or tau neutrinos appear at Soudan, the experimenters will know that the neutrinos oscillated, and that neutrinos therefore have mass.

Construction and bats

The \$5.5 million gets NuMI started, but funding is critical to keep the project moving on schedule. According to Rameika, civil construction of the tunnel here and of the cavern at the Soudan mine is slated to begin in fiscal year 1999, in winter or early spring. The bulk of construction work for the detectors should take place in fiscal year 2000. By fiscal year 2001, experimenters hope to get what is called “beneficial occupancy” of the Fermilab

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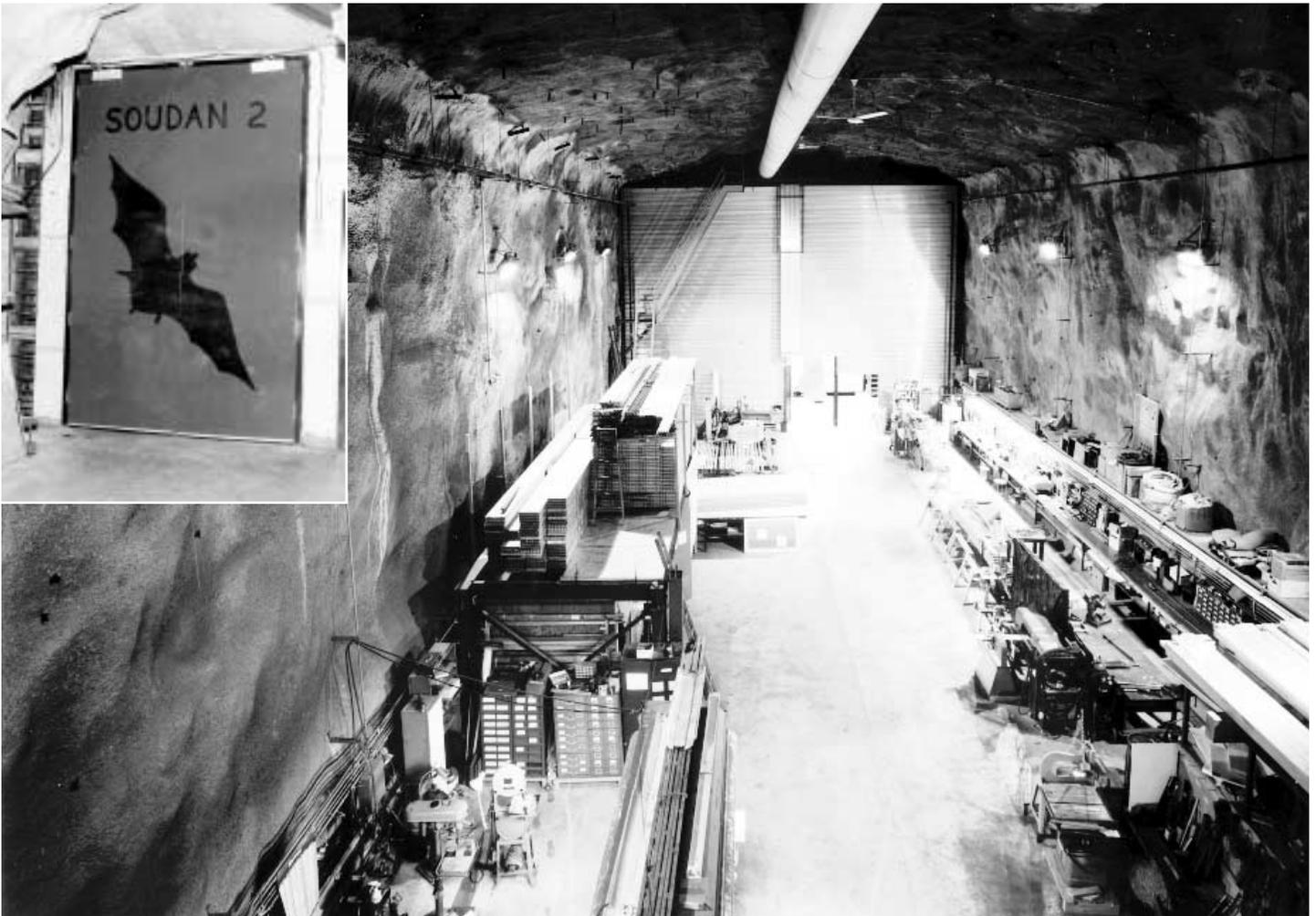
Wheels like this one in the headframe (background) raise and lower the elevator that carries tourists and workers down into the historic Soudan mine.



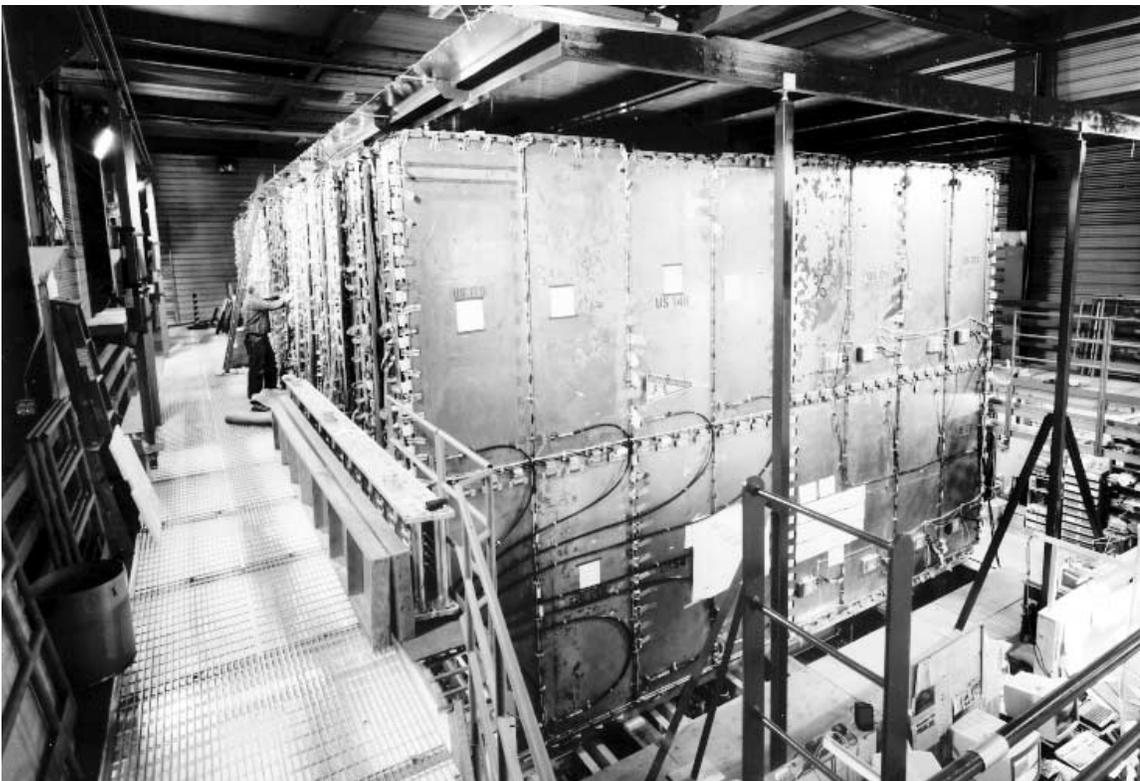
At Soudan, iron ore was once loaded onto trains from this structure. The mining facility was closed in 1962.

Photo by Fred Ullrich

Photo by Reidar Hahn



A doorway (inset) leads to the Soudan 2 lab, located in an excavated hall of the former iron mine.



The 1-kiloton detector in the Soudan 2 lab was built to search for evidence of proton decay. It is now employed in the study of atmospheric neutrinos and will be modified for use in the MINOS experiment.

Physics and the Press

For his master's thesis in journalism, former Fermilab journalism intern Eric Berger chose to study the complex and often ambivalent relationship between the particle physics community and the media. Berger used the results of a questionnaire distributed at Fermilab and at CERN, the European Physics Laboratory, to probe physicists' opinions on a number of issues related to their trade and the media.

By Eric Berger,
Reporter, *Houston Chronicle*

In the fall of 1996, a total of 451 particle physicists, 134 of them from Fermilab, responded to my 40-statement survey on the media. Although only a low percentage of the distributed surveys were returned, the large number of responses did allow me to draw some conclusions from the results.

The physicists who responded did not believe that the media, in general, adequately cover particle physics. Moreover, physicists rated the existing coverage as not good. As several respondents noted, some publications and broadcast programs do an excellent job and others a poor one, making it difficult to venture opinions on the amount and quality of media coverage of physics. Yet the best physics media coverage, including publications such as the *New York Times* and *Science* and television programs such as *Nova*, reach limited audiences. The general conclusion stands: people do not receive much, if any, quality physics news.

Still, particle physicists believe their work merits public interest and understanding. Indeed, respondents wholeheartedly disagreed with the notion that their research lies so far out of the public realm that any potential media coverage is meaningless. From responses to other statements, the physicists who took part in my survey seemed willing to do their part to assist and improve media coverage of particle physics.



Photo by Reider Hahn

Twelve statements from the questionnaire

1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree

	FNAL	CERN
Without government funding, most basic research could not be conducted.	4.72	4.75
The mass media, like newspapers and television, provide an adequate amount of physics coverage.	2.12	2.27
The quality of mass media physics coverage is good.	2.09	2.18
Physics and physics research should receive more mass media coverage.	3.84	3.86
I would welcome the next contact with a journalist.	3.79	3.77
Mass media coverage of physics is not important.	1.72	1.91
Mass media coverage of physics is important for physicists.	3.83	3.74
Mass media coverage of physics research ultimately helps physicists obtain government/public funding.	3.92	3.87
As a physicist, I dislike the idea of speaking to the media because they will probably make an error.	2.38	2.35
By focusing on a specific topic, the mass media raise public interest in that particular topic.	4.11	4.04
It is not important for physicists to learn how to discuss their research in terms clear to non-scientists.	1.62	1.74
Most particle physics research is too far removed from public knowledge to make mass media coverage of it have any value.	1.93	2.07

First, a full three quarters of those surveyed said they would welcome contact with a journalist, a finding consistent with studies that have looked at scientists from other disciplines. Along the same lines, scientists said they did not mind speaking to the media despite the possibility of the journalist's making an error. Finally, nearly every respondent felt the need for physicists to learn how to discuss their research without jargon, in terms clear to nonscientists.

In the study, essentially all the survey's participants said they could not conduct their research without government funding. How do physicists continue to convince legislators to fund their experiments? The majority of respondents felt media coverage, to some extent, helps physicists obtain funding. Also, the participating physicists believe that, by focusing on a particular topic, the media raise public interest in that topic. The general tenor of my survey's results suggests a "we'd rather have it than not" attitude toward media coverage.

Who bears responsibility for promoting the field of particle physics and conveying both its economic and intellectual benefits? Physicists bear it, of course, alone and collectively, through their representative organizations and respective societies. Yet I believe they should realize they have a potential ally in journalism. By working with journalists, allowing the media into their labs, taking the time for accurate explanations of concepts and helping the media find the "news," scientists can spread the message of particle physics. Science journalists, conversely, must be willing to commit time to visit labs, talk with scientists and make sure their representations of concepts do not offend the scientists who are quoted. The benefit for the media, of course, is a chance to tell potentially fascinating stories never told before.

The physicists who responded to my media survey seem simply to want a fair shake and a consistent forum for sharing their research, a request to which science journalists can and should assent. ■



In exhibits at the Soudan Underground Mine State Park, dummy miners push carts of iron ore.

NuMI

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tunnel and the Soudan hall, allowing installation of the detectors and beamline components, a process that takes about a year. Finally, Rameika said, "the goal is to begin commissioning [turning the beamline on and getting the detectors working] in late fiscal year 2002."

But first, excavation of the tunnel here at Fermilab is waiting for DOE's budget for fiscal year 1999.

And construction of the hall in the Soudan mine is waiting for a requested \$3 million from the University of Minnesota.

Construction in Soudan may also have to wait for the Little Brown Myotis bats that live in the 54 miles of tunnels in the former mine. According to Bill Miller, manager of the underground Soudan 2 lab, this is the largest bat habitat in the upper Midwest. Bats from as far as 250 miles away come to roost in the Soudan's caverns.

Trouble is, the bats begin hibernating in September, and finally rouse themselves at the end of April. If construction should begin during that time, the bats might wake and fly to some quieter place, meanwhile using up too much of their stored food supplies to survive the winter. They could very well die.

One solution is to begin construction between May and August. That way, the bats will find another roosting spot before any damage is done.

But even if construction needs to begin earlier, Miller claims there shouldn't be a problem. Just make a lot of noise in September before the bats settle down to sleep.

And how does Miller propose generating noise? Set up a stereo system, he said, and "play something obnoxious like heavy metal." ■

Chez Léon

M E N U

Lunch served from
11:30 a.m. to 1 p.m.
\$8/person

Dinner served at 7 p.m.
\$20/person

For reservations, call x4512
Cakes for Special Occasions
Dietary Restrictions
Contact Tita, x3524

Lunch Wednesday November 26

Cheese Fondue
Caesar Salad
Pineapple Slices

Dinner Thursday November 27

CLOSED
Happy Thanksgiving!

Lunch Wednesday December 3

Game Hens
with Mango Rum Glaze
Green Rice
Corn and Red Peppers
Chocolate Almond Mousse

Dinner Thursday December 4

Smokey Clam Chowder
Grilled Duck Breast
with Sherry Beurre Blanc
Wild Rice with
Woodland Mushrooms
Brussel Sprouts with
Bacon and Lemon
Mocha Butter Cake
with Chocolate Ganache

CLASSIFIEDS

FOR SALE

- '96 Suzuki Swift, 11K miles. Almost new, \$8,500. Contact Alberto, x3589 or santoro@fnal.gov.
- '95 Dodge Caravan, 40.5K miles. Very good condition, \$10,000. Contact Alberto, x3589 or santoro@fnal.gov.
- '87 Honda Civic, 127K miles, 4 dr, new brakes, new tires, \$3,000. Contact Alberto, x3589 or santoro@fnal.gov.
- '87 Chevy Blazer, has 158K miles but a new factory-installed motor with 30K miles on it, \$3,000. '86 Ford Tempo, \$500. GE hotpoint stove, \$50. Call Robin, x3377.
- Four American racing equipment aluminum wheels, 15" x 8", with P275/60R15 BF Goodrich T/A radial tires. Fits full-size Chevy truck (5 lugs). Never used in winter. \$400. Contact x4396, (630) 859-8596 or pritchard@fnal.gov.
- PC, Packard Bell, 100 MHz Pentium, 2 HD (one is 1.2 GB, other 2.0 GB), CD-ROM and 3.5 d. driver, BJ-C610 Cannon printer and a multimedia computer station. All for \$1,500. Call Alberto, x3589 or santoro@fnal.gov.
- Atomic Arc 195 skis, Salomon 547 sport bindings, size 12 US or 13 EU Trappeur 2000 boots (also have poles, ski & boot bag), \$200 obo; Head skis older-style bindings, \$25; Kenwood multicomponent stereo system w/cabinet, includes linear-tracking turntable, amplifier ka-94, synthesizer am/fm tuner kt-54 (memory holds 14 am & 14 fm stations), graphic equalizer ge-34, dual-deck cassette recorder kw-64w, cd player dp-840, 2 4-way 150-watt speakers jl-840. \$1,500 obo. Contact Terry, x4572 or skweres@fnal.gov.
- Gravely convertible lawn tractor, 12 hp B&S, walk behind with sulky, dual wheel with chains, 40" mower deck, 30" snow thrower, old but in good condition, \$750. Contact Mark, x4776 or markl@fnal.gov.
- Moving sale: small TV, \$90; Samsung microwave, \$50; Hoover Eureka Boss, \$50; Hamilton Beach blender, 10 speeds, \$15; Betty Crocker toaster, \$10; iron & board, \$10. All together, \$200. Everything is 1.5-2 years old and seldom used. Must go before Thanksgiving! Contact riotto@fnas07.fnal.gov, stropolo@uic.edu or (630) 416-2180 after 7 p.m.
- Moving estate sale: China cabinet, buffet, tables, lamps, 2 sets china, sterling-silver tableware, silver-plate tableware & serving pieces, 2 antique lace tablecloths. Antique rocker, stool and pillow. Maple rocker, antique "grandma" rocker. Child's solid wood table & chair, antique child's chair w/needlepoint seat, porcelain 14-pc child's tea set. Oak desk, credenza, 5-drawer dresser, double dresser w/mirror. Whirlpool compacto, small kitchen appliances. Hummel figurines, jewelry & so much more. For appointment, call (630) 896-8052. Please leave message.
- House, 5 mins from Wilson Hall in Wind Mill Cove, Batavia. This 4-bdrm colonial is on a quiet cul-de-sac w/ beautifully landscaped fenced-in yard. Many upgrades incl. a fireplace in family room, 2-1/2 baths, 2-car garage and a full basement, plus central air conditioning. \$219,500. Call Jim, (630) 879-6246.

CALENDAR

DECEMBER 4

Wellness Works presents: Changing Personal Habits, Melissa Wolf, 11:30-1 in 1 West.

DECEMBER 12

Fermilab International Film Society presents: *Night of the Hunter*, Dir: Charles Laughton, USA (1955). Admission \$4, in Ramsey Auditorium, Wilson Hall at 8 p.m.

ONGOING

NALWO coffee mornings, Thursdays, 10 a.m. in the Users' Center, call Selitha Raja, (630) 305-7769. In the Village Barn, international folk dancing, Thursdays, 7:30-10 p.m., call Mady, (630) 584-0825; Scottish country dancing Tuesdays, 7-9:30 p.m., call Doug, x8194.

LAB NOTE

TUITION REQUESTS DUE

A reminder to students needing tuition reimbursement advances before the end of the year: In order to ensure your request is processed this year, advance requests must be turned in by Wednesday, December 12. Forms received after this date will be processed in January. Thank you for your cooperation.

MILESTONES

RETIRING

- Arthur Gilbertson, ID #348, on November 14, 1997, from TD/Material Control group.
- Jean Lemke, ID #57, from the Director's Office, on November 21, 1997.

HONORED

- Fermilab, by the American Heart Association, for employee contributions in 1997.



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Fermi National Accelerator Laboratory

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With the holidays approaching, FermiNews will be published on a revised schedule. The next two issues will appear on December 12, 1997, and January 9, 1998.

The deadline for the Friday, December 12, 1997, issue of FermiNews is Tuesday, November 25.

Please send your article submissions, classified advertisements and ideas to the Public Affairs Office, MS 206, or e-mail ferminews@fnal.gov.

FermiNews welcomes letters from readers. Please include your name and daytime phone number.

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