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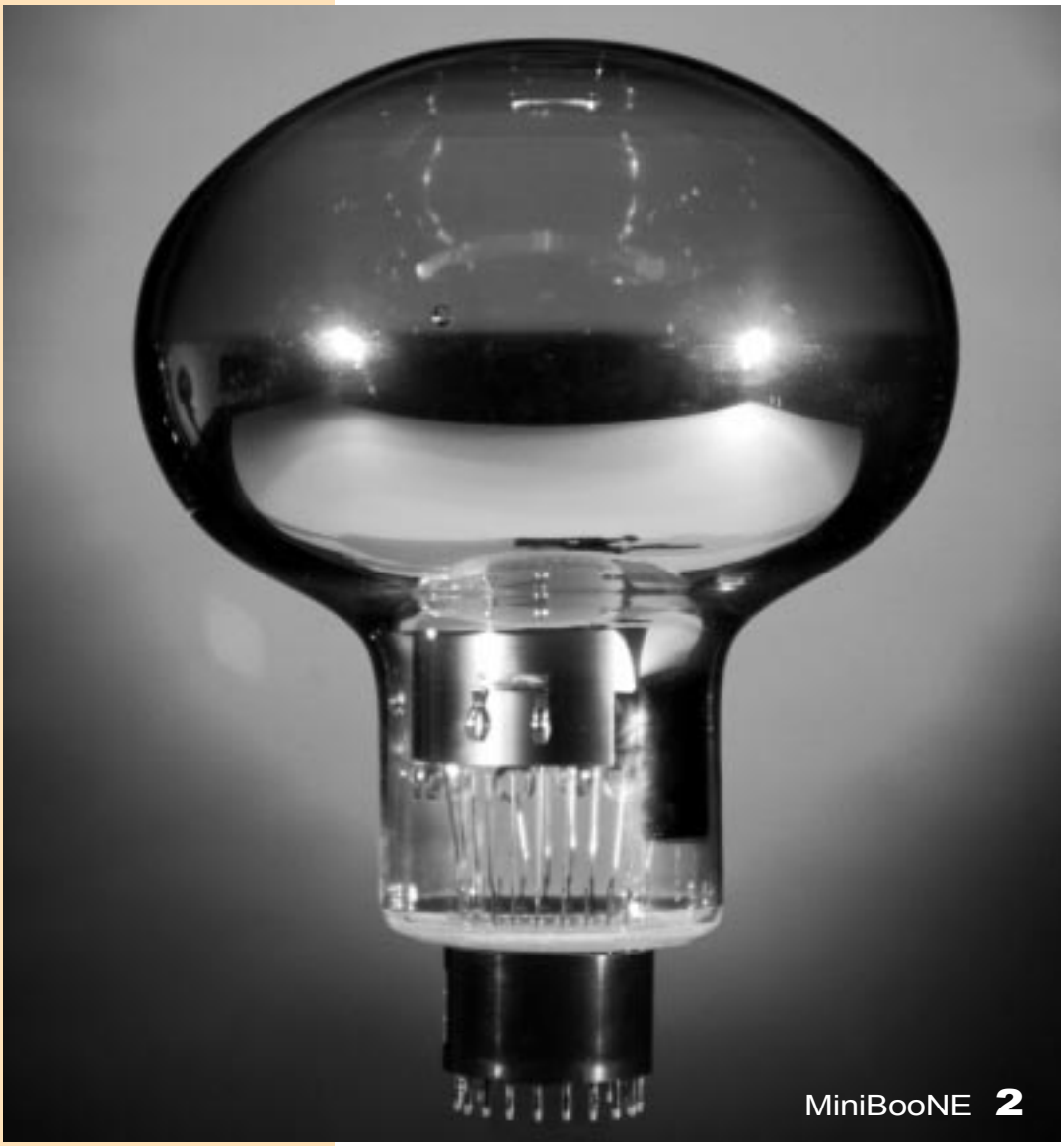

MiniBooNE **2**

Photo by Reidar Hahn

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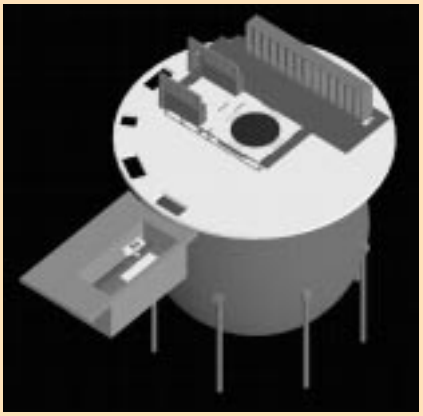
INSIDE:

For the MiniBooNE Detector:

The Teletubby Design

by Sharon Butler



Graphic by Jan Boissevain, Los Alamos National Laboratory

Current plans for MiniBooNE's experimental facilities, with a circular electronics workroom on top of a spherical tank, all buried underground.

On the cover: Prototype of a phototube for the MiniBooNE detector.

Since the last installment in our series on the fledgling MiniBooNE experiment, physicists have been busy hawking their research proposal to the Department of Energy and the National Science Foundation. Both agencies promptly committed funds, and one mysterious well-wisher in New York City even sent in a $40 check.

With money nearly in hand, the MiniBooNE scientists and engineers set to work six months ago on the final design for their detector and began pulling together a bid package for its construction. Their goal was to have construction underway before the end of the fiscal year.

As it turned out, babysitting duty proved invaluable experience in the detector's design.

First, there was a concept. Dig a cylindrical hole in the ground 40 feet deep and 50 feet in diameter. Assemble a giant, four-story-high spherical steel tank inside. Line it with phototubes, fill it with mineral oil and bury it under an earthen mound. One important question remained: where to put all the electronics—the cables, racks, amplifiers, readout channels, computers.

The electronics started out in classic Fermilab-issue portakamps, and gradually migrated closer to the hole-in-the-ground with each iteration of the detector's design. Finally, the engineers thought they had the solution. Build a T-shaped structure above ground, extended from the top of the tank. The space was cramped, but it seemed to work.

Until … a "value engineering" meeting brought in outside experts to weigh in on the problem. Value engineering is a practice associate director George Robertson has been pushing at the Laboratory.

For the meeting, facilitated by the Army Corps of Engineers, 25 people were stuffed into a room at Fermilab: members of the MiniBooNE collaboration, Fermilab's own experts in architectural, structural, civil, mechanical and electrical engineering, consultants from Crawford, Murphy, and Tilly—and, critically, a few retired engineers from Fermilab, including Tom Pawlak.

Jeff Sims, design coordinator for the project in Fermilab's Facilities and Engineering Services Section, walked everyone through the project and the design specifications. Then, as is customary in value engineering exercises,

Notice the similarity? Above, the Teletubbies' playroom; right, view of MiniBooNE's experimental area, covered by an earthen mound.

the group broke into a freewheeling brainstorming session, throwing out ideas, one on top of another, until the well was dry. They picked through the ideas: Out of 60, 20 seemed workable—and, in the end, 15 were incorporated into the final design.

Throughout the entire discussion, Sims said, Pawlak was "pretty quiet." But at the end of the first intense day, Pawlak, who had been babysitting his grandchildren, pulled Sims aside. "I have an idea I'd call the 'Teletubby' concept. I'll fax you my thoughts."

Sims, who has a one-year-old son, knew immediately what Pawlak was referring to. Forget the T-shaped structure for all the electronics. Just as Teletubbies romp about on a mound of earth, emerging from a big circular playroom underground, so, Pawlak was proposing, the MiniBooNE experimenters could build a circular electronics room under a mound of earth right on top of their detector. That would give the scientists a huge open space in which to place their electronics, with cabling easily threading through the floor directly into the pre-amplifiers instead of streaming down a corridor. To create the room, they just needed to extend upwards the cylindrical retaining walls around the detector and lay a concrete floor. The new design would save both time and money.

"It was a big moment in the evolution of the detector's design," said Rex Tayloe, of Los Alamos National Laboratory, who has been managing the project along with Fermilab physicist Peter Kasper.

"Structurally and architecturally," said Sims, "it was a better solution than the T-shaped building."

CMT worked feverishly to draw up the new plans and specs. The bid package went out on July 29, 1999, meeting the schedule the scientists had set well over a year ago.

The package is a monstrous document, "pure drudgery" to review, Tayloe said. Some 40 drawings on giant sheets of white paper lay out the detector from every angle. A five-pound book specifies the properties and dimensions for every conceivable item: the sizes, types, and colors of electrical wires; the strength of the concrete; the temperature (200 degrees Fahrenheit) and length of time (24 hours) to cure the paint inside the detector (so that solvent organic compounds don't leach into the mineral oil). The tank and the civil construction are expected to cost about $1.5 million.

Bill Louis, cospokesperson for the MiniBooNE experiment, praised the FESS and Business Services staff for their help in getting out the bid package: "People at Fermilab are not only good and talented; they are willing to help; they want to get things done."

He described the new and final design for the detector as "efficient and [Teletubbies notwithstanding] elegant."

Of course, he added without missing a beat, Fermilab deserves elegance.

Photo by Reidar Hahn

Janet Conrad and Bill Louis, cospokepersons of the MiniBooNE experiment, with a model of the support structure for the detector's phototubes.

Back to the FUTURE

by Mike Perricone

Building components for Europe's Large Hadron Collider has given Fermilab a stake in the next big machine for high-energy physics, and brought Fermilab back to prominence in the field of superconducting magnets.

Engineers Tug Arkan (left) and Rodger Bossert examine the end structure of one of the final model magnets.

"This project has successfully revived the top-notch effort in superconducting magnet development at Fermilab," said Jim Strait, project manager for the three-lab U.S. collaboration producing LHC magnets. "That's important for the Lab's long-range health, and for the future of high energy physics in the U.S. We also hope to be a model for future international collaborations."

Superconducting magnets operate slightly above absolute zero (-273 degrees C, or -452 degrees F), temperatures where some metals conduct electricity with virtually no resistance. Fermilab became the leader in the field with the construction of the Tevatron, the world's first superconducting particle accelerator with its 1,000 superconducting magnets.

But in the 1980s, the Superconducting Super Collider was seen as the premier superconducting magnet lab in the U.S., draining resources from Fermilab. The SSC was laid to rest in 1993, and superconducting magnet development lay dormant at Fermilab until 1995. Then came plans for the LHC, and an opportunity for Fermilab to contribute in one of its signature areas of expertise. But some of the experts had left, and others were working on other projects.

"Rebuilding a group of people with real competence in making and designing superconducting magnets has taken a lot of work," said Jim Kerby, project manager for the Fermilab LHC effort. "Technical Division Head Peter Limon has worked very hard at it, and we now have a great team with solid expertise, drawn from all over the world. Walking down the hallway is a real international experience."

The U.S. commitment for LHC accelerator and detector contributions to CERN is $531 million over eight years. Fermilab is home for two groups contributing to LHC at CERN, the European Particle Physics Laboratory in Geneva, Switzerland. The US/CMS group is building components for the

*Building **LHC components** restores **Fermilab** to **SUPERCONDUCTING** magnet prominence.*

Compact Muon Solenoid detector (see *FERMINEWS*, April 2, 1999).

Kerby's 40-member group is developing and building 18 high-gradient quadrupole magnets for the LHC inner triplets, which provide the final focusing of the particle beam at the interaction points. Fermilab is also responsible for building the cryostats ("thermos bottles" supporting and insulating the magnet cold masses) and for assembling all the inner triplet quadrupole systems, with an additional 18 cold masses from Japan's KEK Laboratory, and corrector elements from CERN.

Strait is coordinating the Fermilab effort with those at Lawrence Berkeley National Lab and Brookhaven National Lab. Berkeley Lab is building cryogenic components to connect the Fermilab-built magnets with the CERN cryogenic system, and particle absorbers that protect LHC from the heat energy generated by its own luminosity. LHC will produce about 1,000 times the number of collisions per second as the Tevatron. Brookhaven is building beam separation dipole magnets for the interaction regions and the radiofrequency straight section. With its premier capability for the production testing of cables, Brookhaven is testing all superconducting cables for all LHC magnets.

The 5.5-meter focusing magnets being built at Fermilab carry the CERN designation MQXB. Together with the Japanese (MQXA) magnets, their function is equivalent to Fermilab's "low beta" quadrupoles: producing the smallest possible beam "spot," or cross-sectional area, at the interaction points. Because the magnetic field essentially determines the luminosity of the machine, Strait said the MQX's are among the most challenging magnets at LHC.

After a rough start, recent successes mean the group is close to wrapping up the model magnet phase, and moving on to prototypes. The models, which take three to four months to build, are full-scale in diameter, containing all the elements of the complex end segments. But they are just 1.7 meters long. They can be suspended on end and immersed in the cryogenic dewar of the Vertical Magnet Test Facility instead of needing individual cryogenic systems. The full-length, instrumented prototypes planned for next year will follow the final magnet design as closely as possible, needing their own cryostats for testing. Kerby expects to begin the final production phase in 2001.

The first Fermilab component ready for shipment to CERN is one of the four sections of a 30-meter-long heat exchanger test unit, built for the Lab by Meyer Tool near Chicago. In a critical step, this test unit will verify an inner triplet system design change proposed by the Fermilab group. Because they're so close to the interaction points, these magnets absorb the energy of many more particles than magnets in other locations around the LHC. Fermilab's calculations predicted that the standard LHC heat exchangers weren't up to the job in the triplets. Moving the heat exchanger external to the cold mass enabled a larger unit with a greater capacity. It also added flexibility in the design of the magnet components being built at Fermilab, KEK and CERN.

Along with the hardware from Fermilab come many intangible "deliverables" to CERN. Among them: the tooling expertise of the Technical Division's Fabrication Group; testing experience of the Magnet Test Facility; beam physics design support; and the engineering skill to assemble all the inner triplet components—quadrupole magnets from KEK and Fermilab, correctors and instrumentation from CERN—into cryostats from Fermilab, and make sure they work.

"We have to tell CERN, 'Here's a magnetic field this strong, this pure, at this position,'" Kerby said. "That's what they need to make the accelerator. The hardware around it is what's needed to make that magnetic field. CERN trusts us to deliver the goods, and we will."

Spanning one of the 7.3-meter heat exchanger modules are (from left) Yuenian Huang, Christine Darve, Marsha Schmidt, Lucy Litvinenko, and Tom Nicol. The heat exchanger is the first item delivered by Fermilab to CERN in the LHC accelerator project.

Photos by Reidar Hahn

The cold mass production facility at the west end of the Industrial Center Building has been recreated by John Carson's tooling group with equipment recovered and adapted from the SSC. "A year ago, this area wasn't even a painted floor," said Jim Kerby, Fermilab LHC project manager.

Summer in

by Sharon Butler

Photo by Jenny Mullins

Seventeen-year-old Benjamin Tsai never wastes a summer day sprawled on the beach. Like a new-age Buddha, he'd much prefer to spend his time lolling on the eight-fold path in cyberspace, sitting contemplatively still in front of a computer screen.

Last spring, Tsai's mother spied the name of one of Fermilab's physicists, G.P. Yeh, in a Chinese-language newspaper published in New York City, where the Tsai family now lives, after emigrating from Taiwan. Could her son come work with Dr. Yeh for the summer?

Tsai arrived just after the July 4 fireworks (with his mother and siblings in tow), and created some fireworks of his own. In less time than it takes to say "Om," he had already scanned the Web, downloaded and installed free software for managing clusters of computers (the kind Fermilab experiments are adopting for their scientific analyses), and written a program to monitor them.

I've been sent to interview this remarkable summer student, and I'm intimidated. His resume is longer than mine, even though I'm old enough to be his mother. For the past three summers, he's been taking courses like contemporary mathematics and mathematical reasoning at the Center for Talented Youth sponsored by Johns Hopkins University. At his high school, the famed Stuyvesant High School in Manhattan, he set up UNIX servers and installed the LINUX operating system. Last year, he enrolled in the Science Honors Program to study chaos theory, fractals and calculus in the complex plane. He founded and operated a mini-Internet system from 1995 to 1997, writes programs in various languages, including C, and scored 5 out of 5 on the advanced-placement computer science exam. No wonder: He bonded with computers at the age of 11.

Tsai is parsimonious with his words even when I try to draw him out. Our conversation goes something like this:

"How did you first get interested in computers?"

"I'm not sure."

"Did you have a computer at home (back in Taiwan)?"

"Yes."

A remarkable high-school student shares his computer talent with Fermilab.

CYBERSPACE

"What kind?"

"A 286."

"What did you like about it?"

"Well, I don't like it very much anymore."

"Why not? Is it too slow?"

"Yes."

"But you liked it in the beginning, no?"

"Yes."

"What did you do with the computer?"

"I did a little BASIC programming."

"Did you teach yourself?"

"Yes, I had a book."

"What book was it—*Programming for Dummies*?" [It's a vain attempt at a joke.]

"I don't think the *Dummies* series was out then."

"Can you tell me what it is you like about computers?"

"Not really."

"Do you like the logic of it?"

"It's nice."

I suspect that Tsai doesn't want to waste precious uploading time on a computer ignoramus like me, but his scientific colleagues here all have the same experience: Tsai speaks in "short, precise, strong" statements. He is "quiet and moves slowly," they say, "but he thinks fast. "

So I'm not insulted. In fact, Tsai seems mildly amused whenever I ask him to explain the most mundane computer terms. Isn't CONDOR the name of a New World vulture that soars among the peaks in the high Andes? Tsai receives my question with one of his enigmatic smiles.

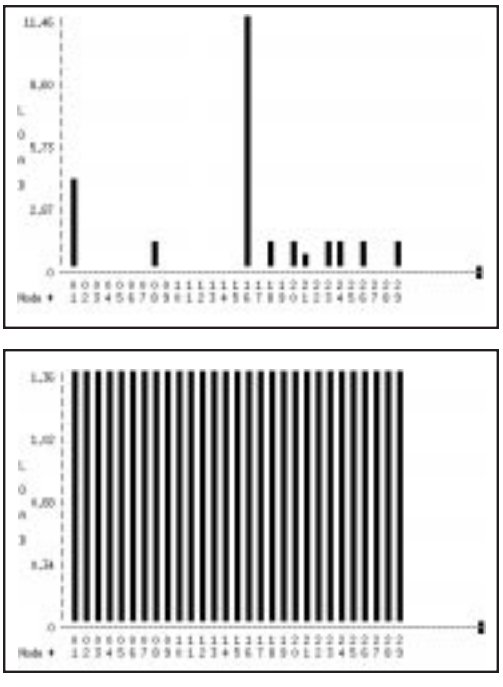
CONDOR, it turns out, is a batch system, one of several Tsai is evaluating this summer to help scientists solve their data management problems. "He's contributed noticeably, especially given that we asked him to look into very complex things," said Fermilab scientist Igor Terekhov.

And what has Tsai been doing for fun?

In the evenings, when everyone else is watching ER, he might be testing a mail delivery system for his server (which he uses to host Web sites for friends) or writing new programs for his school's Web site. If he has "nothing better to do," he said, he might play an on-line game like Everquest.

But he's not all computerware. He plays the violin, practicing a little every day. On occasion, he might even pull out his 90-millimeter Maksutov-Cassegrain telescope to spot some of the brighter objects in the sky. Still, he concedes, "My computer usually comes first."

When Tsai leaves Fermilab to return to school in September, he'll be back to contemplating more mundane things, like early admission to —where else?—the Massachusetts Institute of Technology.



A load-balancing program Benjamin Tsai evaluated, called MOSIX, distributes jobs among all the computers in a cluster. Processes started on one computer (top) are distributed to run on multiple computers (bottom) in the cluster.

How They Spent t

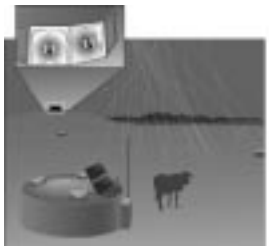
By Judy Jackson

Matt Hillbrenner, a Tulane University junior, and Brian Dold, of Indiana University, developed a Web-based document-management system to publish and track technical notes and other Technical Division documents. You can see the product of their efforts at www-td.fnal.gov/cgi-bin/docLib/document.pl

Web page

Tape robot

Whitney Jackson, a junior at the University of Illinois, helped develop programs for the SAM system that the DZero collaboration will use to manage the unprecedented volumes of data generated in Run II at the Tevatron—data that the tape robot, left, will fetch, carry and mount on tape drives for analysis by experimenters from around the world.



Pierre Auger particle detector

Derek Strom, of Augustana College, worked on data analysis and detector development for the Pierre Auger Project, an observatory under construction in Argentina to track mysterious ultra-high-energy cosmic rays, using water tank detectors of the type shown here.

Web page

Stephanie Butler of Glenbard South High School, worked in the Computing Division where she created a Web site on Fermilab history, "The Creation of a Laboratory." You can see how Stephanie spent her summer at www.fnal.gov/projects/history/exhibit

They mowed grass, built Web sites, pulled cable, answered ph dozens of university and high-school students who descend o to life at the high-energy frontier. Now, at summer's end, most armed with—we hope—new skills to bring to the support of pa

he Summer of '99

ones and wrote computer programs. They are a few of the
n Fermilab each summer, bringing their own youthful energy
have headed back to school; but many will return next year,
rticle physics research at Fermilab.

Trisha Tuntland, a senior at Aurora University, helped handle the phones in Fermilab's busy Office of Public Affairs, answering questions ("No, it is not true that Brookhaven National Laboratory plans to blow up the world, despite what you may have read."), providing information (You can take a self-guided tour any day of the week.") and responding to concerns ("Yes, it is safe to eat the fish you catch at Fermilab.")

On the phone

Web page

Dave Legacki, a senior at UCLA, worked in Fermilab's Magnet Test and Development Group, creating a program to track and fix software defects for systems used in critical measurements for superconducting magnets, the bedrock technology for hadron colliders such as Fermilab's Tevatron and CERN's new Large Hadron Collider.

Mowing the grounds

Craig Wilderspin, of Ripon College; Brian Smith, of East Aurora High School; Justin Goldman, of West Aurora High School; and David Coulson, of Wheaton North High School, spent the summer caring for Fermilab's 6,800-acre campus in the Roads and Grounds Department. Asked to sum up the summer's activities in a word, Wilderspin thought for a moment before replying: "Mulch."

EXPERIMENTERS BET on NEW SOFTWARE

"God does not play dice!"
—Albert Einstein

"All the evidence shows that God was actually quite a gambler, and the universe is a great casino."
—Stephen Hawking

by Mike Perricone

Whether or not God is a gambler, mortal physicists eagerly declare their devotion to Monte Carlo.

They're referring to "Monte Carlo data," spun from a mathematical casino of the mind, with a metaphorical roulette wheel generating random numbers to create a critical physics experimental tool: the simulation.

"In the end, claiming a discovery comes down to having something that looks more like a simulation of new physics than it looks like the Standard Model that we know and understand," said John Womersley, one of the leaders of the software effort for the DZero experiment. "That simulation must be something we know and trust."

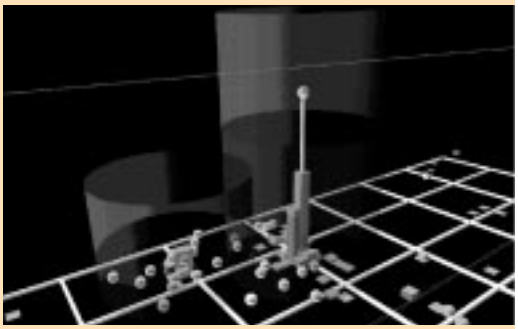
Monte Carlo data creates simulations for a range of possible outcomes that the detectors will see in particle collisions, using random numbers at each turning point along the way to nudge the process in different possible directions. While no single result is definitive on its own, the array of simulated outcomes can show patterns that point to new discoveries—or to more of the same old stuff. That distinction, based on what's termed Monte Carlo simulated data, can represent the difference between success and failure in the search for new physics.

To develop the reliability that must be implicit in their simulations for Run II, Womersley and the DZero software developers are issuing the Monte Carlo Challenge: a huge number of simulated "events," or particle collisions, consisting mostly of conventional background but also sprinkled with what Womersley calls "interesting stuff."

The Challenge simulations will be distributed to physicists throughout the 400-member collaboration beginning in October. A Monte Carlo Physics Workshop is planned for 2000, when collaboration members can present the results of their gleanings and compete for (non-simulated) prizes.

"We hope to use the Challenge as a way of restarting the physics effort, which has been a little dormant over the last couple of years because we haven't been taking new data," Womersley said. "Getting people interested in these simulated events is a way to demonstrate whether this whole vast amount of software works together, and it's a way to prepare to get the best physics out of it right from the beginning of the next run."

Womersley's description of a "vast amount of software" isn't an overstatement. About a quarter of the DZero collaboration, some 100 members, have been working on developing new software for what will essentially be a new detector for Run II. In addition to relying on energy measurements in its huge calorimeter, DZero will also make tracking measurements (as CDF historically has done) with the addition of a magnetic field and silicon vertex detector close to the point of the collisions between protons and antiprotons.



A Monte Carlo simulated supersymmetry event, reconstructed with the C++ software.

Photo by Reidar Hahn

John Womersley makes a point while examining a data display with Amber Boehnlein (seated), of the Computing Division's Physics Analysis Tools group, and Fermilab postdoc Gustaaf Brooijmans, who is working on trigger software. The display they are viewing is projected onto a screen behind them.

"If you reject 99.99 per cent of all collisions and keep the remaining interesting ones, you'd better make sure that new physics fits your definition of what's worth keeping."

—John Womersley

New capabilities mean new software to record and analyze new data, and DZero's old Fortran-based software wasn't up to the challenge. Womersley estimated that of a million lines of Fortran code, only one-fourth to one-third would be useful for Run II. That opened the door to what he termed a "radical" solution: starting all over.

A particle collision experiment needs at least three huge software efforts to understand the physics it produces: triggering, or sorting interesting events from uninteresting ones as they happen; reconstruction, or envisioning the collision by examining what's left; and simulation, or predicting how an interesting event will look. There's also a great need for on-line software, furnishing the control-room displays for monitoring the detector, providing controls for high voltage and detector parameters, and insuring data is of good quality by insuring the detector is operating as well as possible.

"It's an unseen vital detector component that's part of the upgrade efforts for both CDF and DZero," Womersley said. "If we mess it up, we mess up the experiment just as surely as if a component of the detector didn't perform as it should."

The software renovation came just as a new style of programming, called "object-oriented" software, was maturing. The products of a particle collision can be seen as objects, with properties to be derived and worked with; the object-oriented C++ language allows the linking of information about that object with the operations that can be performed on it. Object-oriented programming also fits naturally with graphics systems that can display objects in three dimensions.

Younger physicists are heavily represented through the DZero software effort, partly because younger people generally have more time to devote to the project than do senior physicists with additional responsibilities. But DZero was conscious from the beginning that using C++ would tilt the age balance. Younger people haven't had to shift their way of thinking: they learned C++ in college, where Fortran is now regarded as out of date.

But working with software and data requires infrastructure. The Computing Division's Joint Projects Group developed the basic software toolkits needed at both CDF and DZero. The Computing Division is also responsible for the infrastructure needed for networking, storing and processing data. Each detector has required about $9 million in computing hardware, with the Computing Division purchasing, installing and maintaining the equipment.

Instead of recording data on tape at the experiment, the event data will be sent by fiber optic cable to the Feynman computing center. There it will be processed by a "farm," a large number of relatively inexpensive PC's with a Linux operating system, and filed and retrieved by a tape robot system. Experimenters then will have access to an array of classifications: for example, they can request all the events recorded, or only those taken on a certain day or with a certain trigger.

All the software must be up and running—and viewed as reliable—for the opening moment of Collider Run II of the Tevatron in mid-2000. Now is the time to spin the wheel, establish the odds, and learn what to expect. The last thing physicists want to do is gamble with the results to come.

"If you reject 99.99 per cent of all collisions and keep the remaining interesting ones, you'd better make sure that new physics fits your definition of what's worth keeping," Womersley said. "Or else you'll look pretty stupid if something shows up later at LHC that we could have found here if we'd had a smarter trigger or a better reconstruction program. That's everybody's nightmare."

It's time to place your bets.

the talk of the lab

Recycling, the great leveler

Whether arranged neatly or in cluttering clumps, paper is the common denominator of offices everywhere. Wilson Hall, the 16-story administrative heart of Fermilab, is no exception.

In keeping with its historical environmental consciousness—most evident in the abundant wildlife and restored prairie lands of its 6,800-acre site—Fermilab has begun a new effort in tackling the paper piles in an environmentally sound way. Offices in Wilson Hall now feature three color-coded disposal bins: one for conventional trash and garbage (such as food wrappers), and two for paper recycling. Separate receptacles, near the elevators on each floor, are the preferred destinations for cardboard boxes, which must be broken down before being tossed.

The recent memo explaining the system included several examples of the kinds of paper recyclable in the two paper categories. White Paper is pretty straightforward: white printing and duplicating paper, white notebook and scratch paper.

Colored paper, newspapers, magazines, file folders, engineering drawings, telephone books, and envelopes, with or without windows, were all listed in the category of Mixed Paper (Junk Mail), which also cited a specific example for glossy paper: *FERMINEWS*.

As they say, today's news is tomorrow's recyclable.

—Mike Perricone

The Couture of Particle Physics, or Who You Callin' Scruffy?

"Physicists, I concluded, have an image problem. For too long we have neglected our own shabby appearance…"

From a letter to Physics Today, July 1998, by Jeremy Levy of the University of Pittsburgh

"Physicists often get into the habit of looking somewhat scruffy…" Malcolm Browne, "Scruffy Is Badge of Pride, but Some Physicists Long for Cool," The New York Times, July 21, 1998

"My ambition is to live to see all of physics reduced to a formula so elegant and simple that it will fit easily on the front of a t-shirt." Leon Lederman, in "The God Particle."

When the ultimate t-shirt moment arrives for the Theory of Everything, Fermilab will be ready. We may not have the formula, but we do have the t-shirts. We're wearing them. Elegant and simple — the *dernier cri* in fashion at the energy frontier. Indeed, late summer attire in this *fin de siècle* season at America's forefront laboratory for particle physics includes a multitude of variations on the timeless t-shirt theme. These classic knitted garments are being worn in every shade from dazzling white right through the (visible) spectrum, many exquisitely emblazoned with logos of the world's trendiest physics conferences.

The fashion craze that took the particle world by storm this summer featured the *soignée* look of Hawaiian shirts every Friday. The legions of fashion-savvy summer students who, each

June, descend on Fermilab from the nation's university physics departments started the trend; and by July, island-inspired rayon was showing up on stylish backs throughout the laboratory.

Very now, very "in": *les blue jeans* and *le polo* in the control rooms and detector halls that embody particle chic at Fermilab, although a daring few at fashion's cutting edge are turning up (and turning heads!) in khaki shorts, a retro look harking back to late last month.

Cotton shirts in plaids and stripes are also *très* hot just now, with sleeves cropped daringly just above the elbow, and two tiny buttons, one at each tip of the collar. We're seeing them neatly tucked in, for a pulled-together effect, or hanging loose at the waist, as a daring statement of *je ne sais quoi*. As autumn's chill advances, we predict a move toward flannel, where again, vibrant plaids will predominate, following a fashion trail blazed by the style *cognoscenti* of the laboratory's Technical Division over the last 25 years.

As always in the chi-chi world of high-energy physics, accessories make the outfit. The pager, most often in elegant matte black, turns up clipped to belts or peeking out of a pocket. Are those Palm Pilots we've spotted accessorizing the *avant garde* in the Computing Division? And, with the timeless elegance of a perfect strand of pearls, the pocket protector never goes out of Fermilab fashion.

What of the well-turned-out foot this year in quark country? Socks with sandals are making quite a splash, with socks in white, to coordinate with t-shirts. Steel-toed shoes are still very big, for a rugged, industrial-chic effect. Poolside, dark socks with wingtips, worn with simple trunks and a towel, impart an exotic eastern-European flavor to prairieland physics gatherings.

And watch for these: The Occam's Razor cut, the long, streaming lines of the red shift, and, for the long-term future, the theory-of-everything t-shirt, elegant and simple—our picks for the ultimate in physics fashion. You heard it here.

—Judy Jackson

And the prize for the summer's best crop of sunflowers goes to...

...the Fermilab Fire Department, for the fourth year in a row, for the stunning 1999 crop produced by Fermilab firefighter Chris Williams. In 1996, aesthetic considerations prompted Williams to add sunflowers to the horticultural mix in firefighter John Babinec's Fire Department vegetable garden. The garden flourishes each year along one wall of the Fermilab firehouse, pumping out peppers, tomatoes and cucumbers for fire-department consumption. The sunflowers thrived at the firehouse, and Williams never looked back. Now, in early September 1999, at more than 10 feet tall, the sunflowers tower over the firefighters, practically requiring a hook and ladder to see them. Could it be the buffalo chips in the soil?

—Judy Jackson

CALENDAR

Web site for Fermilab events: http://www.fnal.gov/faw/events.html

September 10
NALWO Potluck Supper at the village barn. Drinks at 6 p.m. dinner 6:30 barbecue, soda provided. For more info call Ursula (630)548-9850 or ursulam.@enteract.com

SEPT. 11
Barn dances resume in the Kuhn Village Barn with a 7 to 10 p.m. dance. Music is by Jordan Wankoff and Friends and calling is by Dan Saathoff. All dances are taught and people of all ages and experience levels are welcome. Admission is $5, children under 12 are free (12-18 $2). The barn dance is sponsored by the Fermilab Folk Club. For more info, contact Lynn Garren, x2061 or Dave Harding, x2971.

SEPT. 18
Special Saturday night barn dance in the Kuhn Village Barn from 8 to 11 p.m. Music by Jenniffer Jeffries and Roger Diggle with calling by Paul Watkins. All dances are taught and people of all ages and experience levels are welcome. Admission is $5, children under 12 are free (12-18 $2). The barn dance is sponsored by the Fermilab Folk Club. For more info, contact Lynn Garren, x2061 or Dave Harding, x2971.

FERMILAB Prairie Harvest
September 25, and October 23, 10 a.m. to 2 p.m. Bringing a large group? Call ahead (630)-840-3303.

ONGOING
English Classes, Thursday at the Users' Center, 10-11:30, free classes. NALWO coffee for newcomers & visitors every Thursday at the Users' Center, 10:30-12, children welcome. In the auditorium, International folk dancing, Thursday, 7:30-10 p.m., call Mady, (630)584-0825; Scottish country dancing Tuesdays, 7:30-9:30 p.m., call Doug, x8194 or e-mail folkdance@fnal.gov.

1999/2000 OPEN ENROLLMENT HEALTH PLAN CHANGES

This year open enrollment materials will be mailed to your home in early September. The materials include information about costs and changes. The annual open enrollment period to make health insurance changes will start on September 13, 1999 and end on September 24, 1999. Representatives from the health plans will be in the Atrium of Wilson Hall on Monday, September 13, from noon to 5:00 pm and Tuesday, September 14, from 8: am to 1:00 pm to answer any questions that employees may have and to distribute updated information.

LUNCH SERVED FROM
11:30 A.M. TO 1 P.M.
$8/PERSON

DINNER SERVED AT 7 P.M.
$20/PERSON

Chez Léon MENU

FOR RESERVATIONS, CALL X4512
CAKES FOR SPECIAL OCCASIONS
DIETARY RESTRICTIONS
CONTACT TITA, X3524
HTTP://WWW.FNAL.GOV/FAW/EVENTS/MENUS.HTML

LUNCH WEDNESDAY, SEPTEMBER 8
Grilled Cumin Chicken Pitas with Couscous and Yogurt
Caramelized Pineapple with Grilled Bananas and Vanilla Sauces

DINNER THURSDAY, SEPTEMBER 9
Summer Squash Soup with Basil Pistou
Tournedos with Madeira Mushroom Sauce
Tomato Gratinee with Spinach Souffle
Potato Roesti
Lemon Napoleons

LUNCH WEDNESDAY, SEPTEMBER 15
Salmon Wellington
Mixed Field Greens with Shallot Vinaigrette
Angel Cake Torte

DINNER THURSDAY, SEPTEMBER 16
Arugula and Bacon Quiche
Grilled Sea Scallops with Pepper Lemon Salsa
Sauteed Baby Greens with Prosciutto
Peach Spice Cake with Caramel Sauce

FERMI NEWS
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A U.S. DEPARTMENT OF ENERGY LABORATORY

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The deadline for the Friday, September 17, 1999, issue is Tuesday, September 7, 1999. Please send classified advertisements and story ideas by mail to the Public Affairs Office MS 206, Fermilab, P.O. Box 500, Batavia, IL 60510, or by e-mail to ferminews@fnal.gov. Letters from readers are welcome. Please include your name and daytime phone number.

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CLASSIFIEDS

FOR SALE

- ’90 Honda Civic Si Hatchback, 5 speed shift, 92k A/C, Power Sunroof, new brakes, timing belt/life warranty muffler, recent tires and tune-up, vg condt. $3,600.
- ’92 Nissan Stanza, 96k auto, AC, PS, PB, cruise, AM/FM stereo, new battery, tires, never been in an accident, all service records available, xclean, $3,950 obo. Dmitri at 3851.
- ’99 Goldwing SE (Silver)9K Mls - Runs Great $16,850 obo. Has Markland Receiver Hitch and (5 pin) OEM Trailer Wiring Kit Markland Flrbds, foam grips/extra windshield, also 2 headsets for the intercom one full-face helmet model and one that can be used either on a full-face or open-face.
- ’76 17 foot Speedboat with trailer, closed bow layout, very reliable, runs great, Very good condition all around. Asking $3200 obo. Lou x3343 or 761-0118. e-mail: dalmonte@fnal.gov
- Afghan - hand crafted by my 92 year old grandmother. 66″X48″. Colors/egg shell w/mauve and green stripes. Has fringe. $75 obo. Afghans made to order also, any colors, any size. Tammie at (630) 393-7138 or carrier@inil.com.
- PC 386, 33Mhz, 130MB, 8MB RAM, Math Processor, Windows 3.11, Microsoft Word, Excel and more; Viewsonic color monitor; Panasonic Matrix Printer KXP 1123; Works great. $210 Mail to chendi@fnal.gov or call (630) 355-1253
- Lake property in So. MO. 17.5 acres fronts Bull Shoals Lake for a quarter mile, paved road and utilities. Incredible view. Asking $66,500. Alexander Realty, Ben H. Alexander, Broker (417)-273-4808; local info through ‘gardner@fnal.gov’
- Villa Park 3 bdrm bi-level w/2 car garage. Like new kitchen/oak cabinets and Corian counter top, upgraded electrical service and new bathroom on lower level. Oak floors, stairs and stair railing. $147,000 (630)587-9418, x8031 or rsales@mcs.com
- Honey Oak roll top desk, not antique but perfect reproduction. $350, phone 406-6080 after 4 p.m. or x4446
- DT 960 Stair-Stepper Performer, heavy duty w/ fitness monitor, wide steps, water/cassette holder, adjusts. tension shocks, like new,$90. Ken x4225 or 674-1947.
- Timeshare condo $700 a week. Must be used by 12/31/99. To choose available locations refer to http://www.rci.com/ctg/cgi-bin/RCIEmail Terry at skweres@fnal.gov or phone x4572.
- Four-drawer dresser, $25; light tan couch and mahogany chair, $125. All in excellent condition. 630-896-3211.
- Mount Emblem Cemetery. 3 plots located in the beautiful Pine Section, $4,000 total for all 3. Serious inquiries only. Call (630)717-5181.
- CAT CARE - Short or long term cat care in our safe, spacious indoor/outdoor cattery. Quiet, woodland setting. Lots of daily TLC. Contact Laura days x2767 eves (630)393-9553.

WANTED

Two roommates immediately for house in the Village (19 Shabona); costs $1,350 per month ($450 per person for three people). The house gets maid service once a week; electricity and phone free. Contact: X8455 (W), X3342 (H), or hebertcl@fnal.gov.

Saturday, September 18, 1999, 9:00 a.m. to 12:30 p.m.
Wilson Hall, Fermilab

The Chicago Area Great Books Council Presents
A Discussion Seminar On

Conscience, Responsibility, Ethics and Technology

With a keynote address by Beth Witherell, Editor-in-Chief of *The Writings of Henry David Thoreau*

Participate in small-group discussions on chapters 1 and 2 of *Walden*, by Henry David Thoreau; *The Conscience of a Physicist*, by Fermilab’s founding director, Robert Wilson; and *The Responsibility of the Scientist*, by Werner Heisenberg.

Registration is required. Attendance limited. For more information, contact Jack Hatfield, 630-375-0881 (H), 630-840-4120 (W), or jackhat1@aol.com.

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