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INSIDE

URA Renews Contract to Manage Fermilab for DOE

The five–year contract contains new performance–based measures and shifts more liability to URA and the Lab.

by Donald Sena, Office of Public Affairs

In a formal ceremony at Fermi National Accelerator Laboratory on December 18, Universities Research Association, Inc. renewed its contract to manage Fermilab for the U.S. Department of Energy. The five–year deal contains performance–based incentives for the first time and shifts more liability from the government to the contractor and the Lab, as a part of sweeping contract reform efforts in DOE.

"This contract is a good example of government that works better and costs less," said Cherri Langenfeld, manager of DOE's Chicago Operations Office. "The new contracts between DOE and the laboratories are a move toward more results-based management. They allow DOE to back off from micromanagement and leave the labs more responsibility, more time and more resources for research. The new contracts are an expression of DOE's commitment to scientific research."

The contract defines the relationship between URA and DOE and addresses both broad topics and specific details. For example,

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Photo by Reidar Hahn

Fred Bernthal, president of URA, and Cherri Langenfeld, head of DOE's Chicago Operations Office, sign the new five–year contract for Fermilab management.

Another Kind of Experiment

Fermilab receives Illinois grant for science education pilot project

by Judy Jackson, Office of Public Affairs

Teachers from nine Illinois high schools will have a chance to see if they can change the way Illinois students learn science, thanks to a state-funded Fermilab pilot project. Marjorie Bardeen, Fermilab's Education Office manager, announced last month that the nonprofit organization Friends of Fermilab has received a $143,000 grant, renewable for four years, from the Illinois State Board of Education. Under the terms of a cooperative agreement with Friends of Fermilab, Fermilab's Education Office will conduct a four-year pilot program to improve high school science education in Illinois. During the program, based at Fermilab, teams of teachers from nine Illinois high schools will work together to develop "coherent, inquiry based high-school science curricula and implement a three-year sequence of science courses in their respective schools," according to Bardeen.

"It's an experiment," Bardeen said. "At the end of the project, we will report on seven case studies, one from each school team, documenting on how schools apply the science curricula they devise." The program supports systemic reform as called for in state and national reform efforts. Illinois has recently adopted draft state science education standards based on the National Science Education Standards developed by the National Academy of Science.

Gwen Pollock, science consultant to the Illinois State Board of Education and the grant's monitor, expressed high expectations for the project. "I was a high school science teacher for 18 years," she said. "All science teachers know that the right thing to do is to work together in teaching an integrated science curriculum in high school. Yet it is hard to do, in practice. This pilot project has the potential to move beyond the status quo and break the traditional boundaries between science courses to improve science education in Illinois."

Project leaders chose the high schools who will participate in the pilot program to represent the diversity of Illinois schools, including urban, suburban and small rural districts. Participating schools include Best Practice High School and Whitney M. Young Magnet High School, of Chicago; Glenbard North High School, of Carol Stream; J.D. Darnall Senior High School, of Geneseo; Oak Park and River Forest High School, of Oak Park; Wayne City High School, of Wayne City; Galva High School, of Galva; Stark County High School, of Stark County; and Wethersfield High School, of Wethersfield. Teachers from the last three schools on the list will work as a team; each of the other schools will field a four-teacher team of its own to work on the project.

Teachers at an initial project workshop held at Fermilab on December 6 expressed cautious optimism about the project. "I want to see change," said Mark Woods a teacher of geology and earth science at Oak Park River Forest High School. "I am excited about this pilot, but at the same time I am apprehensive that it will be just one more program where we start something and then nothing happens." Woods said he believed the commitment from the State

" All science teachers know that the right thing to do is to work together in teaching an integrated science curriculum in high school…"

~ Gwen Pollock, science consultant to Illinois State Board of Education

Brian Loynachan, a teacher at Glenbard North High School, with some of his students. Loynachan is one of the teachers participating in the education program.

Photo by Reidar Hahn

Board of Education was critical to the project's success. Woods' colleague, chemistry teacher Marlene Rubinow, agreed. "The funding is crucial," she said. "But it's even more the philosophical commitment from school administrators and the community that will allow us to make changes to improve science teaching." Several teachers at the workshop reported that although their schools differed markedly, they found they had the same hopes and concerns for science education as teachers from the other schools.

Throughout the project, a team of outside science education experts will evaluate the results of the changes implemented at the schools to determine whether students are learning more effectively than before. Although the goals of the pilot program are uniform, and all teams will work within the framework of the newly issued Illinois state standards, Bardeen said, "each school will do something different, according to individual circumstances. The teachers who have agreed to take part in this experiment are making a tremendous commitment. It's a lot of work." ■

Photo by Reidar Hahn

Marjorie Bardeen, Education Office manager. Fermilab will coordinate the new science education pilot program funded by the state of Illinois.

All the letters that fit, we print

Fermilab experimenter and University of Chicago Professor Bruce Winstein recently emailed a letter to the editor of *The New York Times.* When his letter failed to appear in the *Times,* Winstein chose the next best option and forwarded his message to *FermiNews.*

Bruce Winstein

Dear Editor:

In your Nov. 3 article "World's Costliest Misprint," about an old Swedish stamp with a printing error for which someone actually paid $1.2 million, your reporter states that the stamp is "milligram for milligram, the world's most valuable thing." For amusement, let's see if this is really so.

The stamp in question is approximately 1.5" x 1.5" x 0.01", thus about 360 milligrams. An equal amount of antimatter would fully annihilate upon contact with ordinary matter, yielding about 20 million kilowatt-hours of energy if fully converted to its electrical equivalent—enough to power a small town for a full year! At my local rate of $.10/kwh, a hypothetical object the same size as the stamp made of antimatter would then be worth about $2 million, making antimatter even more valuable than the stamp, "milligram for milligram."

Fermilab, an accelerator laboratory outside Chicago, using high- energy particle collisions produces the largest quantity of antimatter anywhere. This is done not as an energy source (less than 10 percent of the mass of the stamp has been made) but in part to look for tiny differences in the behavior of this nearly exact counterpart to ordinary matter. For the universe very early in its history consisted of equal parts of matter and antimatter and there must be a distinguishing characteristic that made the antimatter disappear; otherwise,the world would be simply a sea of energy, containing no material objects.

If people gave such matters their attention, and scientists did their job of explaining basic research to the public, everyone could appreciate the importance and depth of the mystery of the disappearance of the antimatter as well as its eventual understanding with new experimental results. Imagine the value of that!

~ Bruce Winstein, professor of physics at the University of Chicago

Do You Participate in Community Groups or Local Government?

If so, *FermiNews* wants to hear from you.

FermiNews editors are seeking staff members who serve in local government, participate in civic organizations or are active in community groups for a story to appear in an upcoming issue of *FermiNews.*

Please call the editors of *FermiNews* at x3351, or send email to ferminews@fnal.gov.

Magnets, Part II

Text by Hank Glass,
Technical Support Section
Edited by Donald Sena,
Office of Public Affairs

In the last installment, we learned what kinds of magnets Fermilab needs to run the accelerator. Magnet fabrication technology is the subject of this part of the accelerator magnet story.

There's the old-fashioned, or "conventional," way to build magnets, based on the observation that when electric current travels through a loop of wire, the current creates a magnetic field. Wind the wire many times, and the field gets stronger in proportion to the number of loops. Magnet builders can make this simple electromagnet even stronger by surrounding the wire coils with iron. Iron (along with few other materials) has a special property in that each iron atom acts like a tiny magnet. When placed in a magnetic field, the iron atoms orient themselves in such a way that they make the field stronger. Magnet builders can control such a magnet by varying the amount of current in the loop: more current means a stronger field. In an accelerator such as the Main Injector, strong fields are needed and, therefore, Fermilab needs to use large currents (nearly 10,000 amps for the dipoles). To carry such currents, the "wire" must be very big—the Main Injector dipoles use copper conductor that is 1"x 4" in cross-section. To carry away the heat generated by this current, magnet builders make a hole through the center of the conductor and circulate water.

Superconducting Magnets

There's a limit to the strength of the field one can generate in these conventional magnets. As the current in the coils increases, more and more iron atoms orient themselves with the field. One reaches a point where all of the iron atoms have gotten involved—the iron has become saturated—and it becomes harder to increase the field beyond this strength. To make stronger magnets, we need a different technology: superconducting magnets. Fermilab's Tevatron was the first synchrotron to use this type of magnet. In an ordinary conductor, such as copper, electrical resistance limits the current one can use. This resistance causes the copper to get hot when current passes through it. But certain materials have an amazing property in which they lose all resistance when cooled below a certain temperature. Fermilab magnet builders use cables made of fine strands of superconducting niobium titanium; the cables loop around the magnet many times. Since each superconducting cable can carry several thousand amps of current, magnet designers can make the total magnetic field, generated by all of these cables, very large.

The niobium titanium wire only becomes superconducting when it is very cold; in fact, magnet builders bathe the wires in liquid helium at a temperature of four degrees above absolute zero (that's about –452° F). Superconducting magnets can achieve fields several times stronger than conventional iron and copper magnets. Therefore, the superconducting magnets can steer particles with the highest energies. There are some important limitations, however; superconducting wires can only carry so much current before they "quench," or become normal conductors. Therefore, superconducting magnets must operate at some safe level below the quench current. Magnet experts can make the quench current higher by cooling the conductor even more. An area of intense research and development today involves building magnets that operate at superfluid helium temperatures, only 1.8° K above absolute zero. Magnets for the Large Hadron Collider (LHC) at CERN will use these high-field, ultra-low-temperature magnets.

Photo by Reidar Hahn

Hank Glass, of the new Technical Division (kneeling), and Dave Harding, of the new Beams Division, work with some of Fermilab's permanent magnets.

Permanent Magnets

There is a third magnet technology, one that uses permanent magnets, that Fermilab has just begun to explore. Both conventional and superconducting magnets require power supplies, contributing to their operating cost. Using magnets that don't need electric power is hardly an innovation—these, of course, are the kinds of magnets used to stick your shopping list to the refrigerator. What's new is the ability to make them precise enough so that they can operate in an accelerator.

If one takes a piece of iron and places it in a strong magnetic field, the iron will become magnetized and gen-

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Profiles
PARTICLE PHYSICS

Romesh Sood

Associate Head,
Technical Division
former head of the
Emergency Management
Department)

Employee I.D. #1886

The Tigers were to arrive in May and we imagined that Romesh's effort would take from six to nine months. Well, it was a much larger effort than we ever imagined."

Deputy Director
Kenneth Stanfield

by Judy Jackson, Office of Public Affairs

The Tigers were coming. The time was late March, 1992, and DOE's infamous Tiger Team, assembled under former Energy Secretary James Watkins to sniff out safety problems at DOE labs, was due to descend on the Laboratory in mid-May. An in-house checkup had found that Fermilab lacked an adequate Emergency Response Plan, a deficit sure to draw growls from the Tigers. Fermilab Director John Peoples brought engineer Romesh Sood to the rescue. By the time the Tigers arrived in May, Sood, the newly appointed head of emergency planning, had put Fermilab's emergency response in place, and the Laboratory had held a sitewide emergency drill. The Tigers purred.

"In March of 1992," recalled Deputy Director Kenneth Stanfield recently, "when John Peoples asked Romesh to move to the Business Services Section to lead the Emergency Planning Department we were intent on bringing our emergency preparedness activity into line with DOE requirements. The Tigers were to arrive in May and we imagined that Romesh's effort would take from six to nine months. Well, it was a much larger effort than we ever imagined and we also asked Romesh to take on larger responsibilities. Looking back now, Romesh and his staff compiled an impressive list of accomplishments."

After the Tigers moved on to other hunting grounds, Sood remained as head of a new Emergency Management Department, which eventually found a home in the Environment Safety and Health Section. Sood later took on the responsibility for the Fermilab Fire Department, the Communications Center, and Laboratory Security.

Last month, Director John Peoples appointed Sood to a new Fermilab assignment as associate division head for support services of the Laboratory's new Technical Division, beginning January 2, 1997. In his new position, Sood will advise Division Head Peter Limon on ES&H, facilities management, and division procedures. He will lead the division's ES&H Group and serve as the facilities manager. In his appointment letter, Peoples told Sood that he "will play an important role in setting up, testing and maintaining the project management system for the division's Large Hadron Collider activities. As you know, the success of Fermilab's contribution to the LHC is an important commitment of both the Laboratory and DOE."

On learning of Sood's appointment to the Technical Division, former ES&H Section Head J. Donald Cossairt praised Sood's abilities. "Romesh is a crackerjack project manager," he said. "He makes things happen. He is one of the most honest, conscientious people I have ever seen."

Photo by Reidar Hahn

Sood came to the United States in 1970 from Naushehra, a small village in northern India, lured by the promise of a job at the Western Electric Corporation in suburban Chicago. When the anticipated job opportunity fell through, Sood went back to school instead, earning an associate engineering degree from Bell and Howell School. When Fermilab hired him in 1972, he went to work in the Neutrino Department, helping to build beamlines for the first Fermilab experiments. "Dr. Wilson, Taiji [Yamanouchi] and I would put Polaroid film at the end of a beamline to see if we were getting beam," Sood said, describing the technology at the time.

While working at Fermilab, Sood earned a 1979 B.S. in engineering and a 1984 M.B.A., both from Northern Illinois University. He also taught himself to play a formidable game of tennis.

In 1990, Sood received the maximum $5,000 award in Fermilab's Energy Conservation Suggestion program, for his idea to install automatic controls in beamlines to reduce beamline magnets to zero current during no-beam

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The University of Arizona at Fermilab and Beyond

The university group covers several prestigious experiments around the world, including two at Fermilab

by Donald Sena, Office of Public Affairs

The University of Arizona high–energy physics group may be relatively small with only four professors on the faculty, but the active team participates in three of the premier particle physics experiments in the world.

The Arizona group has responsibilities at the DZero collider detector and at the KTeV fixed–target experiment on the Fermilab campus, as well as at the ATLAS experiment at CERN, the European Laboratory for Particle Physics. All of this research stretches the understanding of how the universe works, and provides the Arizona students, both graduate and undergraduate, with invaluable experience at the forefront of particle physics experimentation.

Elliott Cheu, the newest faculty member at Arizona, said the aggressiveness of the group in pursuing the most interesting physics, as well as its support for his endeavors in matter–antimatter asymmetry, attracted him to the Tucson campus.

Arizona "has a diverse program for a small group of people. There are only four faculty members and [the group is] involved in ATLAS, DZero and KTeV," said Cheu. "And we are all doing significant work."

The University of Arizona graduates about 30 undergraduates with physics majors per year. The high–energy physics group has had six students receive their doctorates in experimental particle physics since the group's inception in 1988.

The Pre-Arizona Years

All four members of the group performed research at Fermilab before Arizona formed the particle physics group. In 1976, John Rutherfoord, then at the University of Washington, participated in Experiment 439, a dimuon experiment in competition with Fermilab Director Emeritus Leon Lederman's famed Experiment 288, which proved the existence of the bottom quark via the upsilon particle. E439 was the first experiment to confirm E288's results when collaborators observed the upsilon particle a few months later. Through the years, the two experiments spawned more fixed–target studies that furthered similar physics, including E605, which Rutherfoord led along with Chuck Brown and Bob McCarthy.

Mike Shupe, first as a postdoc at the University of Illinois and later as a faculty member at the University of Minnesota, worked on several fixed-target experiments in the 1980s, concentrating on charm production and hyperon magnetic moments.

Ken Johns also ran several experiments at Fermilab starting in the early–1980s. The last of these was E800, where Johns was the co-spokesman. The experiment made the world's most precise measurement of the Omega-minus magnetic moment, which aids in the understanding of the various quark models.

Particle Physics in Tucson

In the mid-1980's the University of Arizona Department of Physics solicited proposals to create a high-energy physics group. Rutherfoord and Shupe put together the winningproposal and

Photo by Reidar Hahn

Some members of the University of Arizona DZero team. From left to right: Kevin Davis, graduate student; Ken Johns, Arizona professor; Ajay Narayanan, graduate student and Freedy Nang, Arizona postdoc.

started the new group in the fall of 1988 to concentrate on the DZero experiment at Fermilab. A year later Johns and Geoffrey Forden joined the team. (Forden recently changed fields.)

The Arizona team, demonstrating their affinity for attacking various parts of a project, worked on complementary aspects of DZero. Rutherfoord, Shupe, Forden and their postdocs and graduate students worked on the liquid argon calorimetry, building electronics for the calorimeter test modules. The Arizona team also participated in the development of DZero's test beam.

Around the same period, Johns worked with the muon trigger system of the collider detector. Events produced by the violent proton–antiproton collisions must be "triggered" on by means of hardware electronics or software filters in order to record their presence. The more routine events are not permanently recorded, as the detector only keeps the most interesting, and possibly rare, events for later analysis by the collaborators.

Specifically, Johns and his students helped develop the level 1.5 trigger for muons. The level 1 muon trigger is hardware–based; the trigger is fast—deciding whether or not to keep an event every 3.5 microseconds—but it is not discriminating enough. The level 1.5 trigger is a more sophisticated version of level 1, according to Johns.

All members of Arizona's DZero team participated in the analysis of Run I data, and six Arizona doctorate theses were based on the data.

"Because we worked with the muon trigger, we were naturally drawn to physics that involved muons, so we were involved in studying a variety of topics in *b* physics. In fact, I was the *b* physics convener for the last two years at DZero," said Johns. "Our physics thrust, if you will, was tests of QCD using *b* quarks."

(QCD, or Quantum Chromodynamics, is the theory that explains the strong interactions of quarks and gluons. A "convener" is, in essence, the scientist in charge of organizing the analysis of the data, a demanding and time-consuming task.)

Johns said his group measured the *b* quark cross section, as well as the angular correlations between a produced-*b* and anti-*b* quark. The latter is a test of the details of how *b* quarks are made from protons and anti-protons, said Johns, and this picture can then be applied to other processes and other energies.

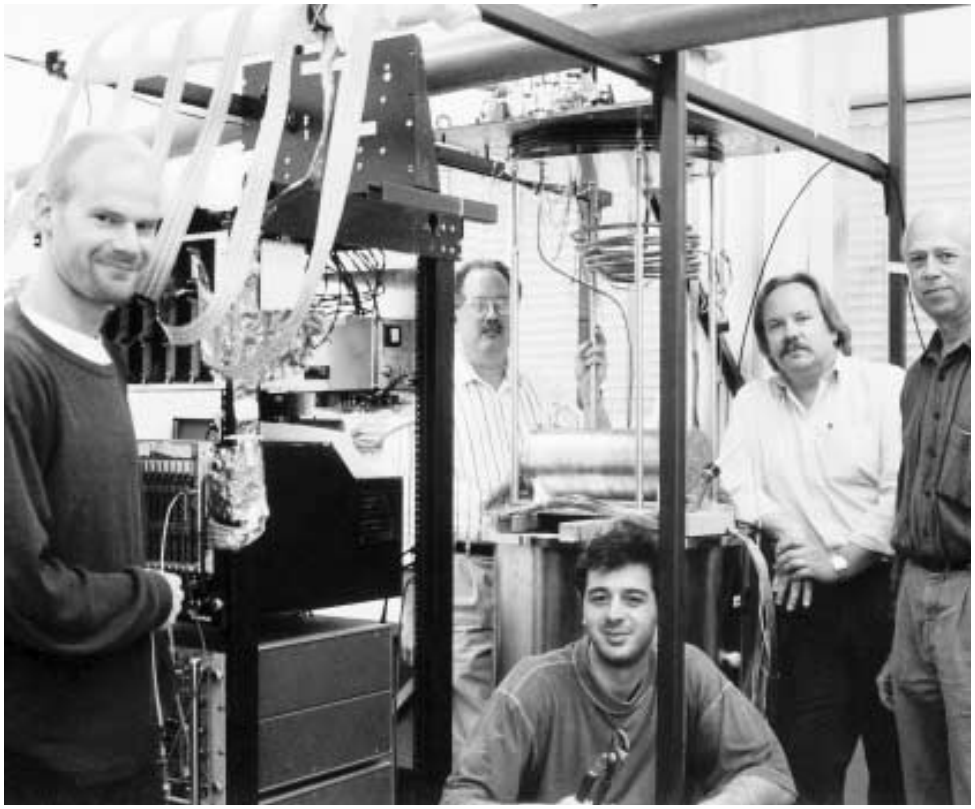

Photo courtesy of the University of Arizona

Some members of the University of Arizona high–energy physics group in a lab on the Tucson campus. Left to right: Dave Fein, postdoc; Mike Shupe; graduate student Levan Baboukhadia (kneeling); Leif Shaver, engineer; and John Rutherfoord.

The Upgrade

Johns and Shupe have now turned their attention to the DZero upgrade. Johns and John Butler of Boston University are heading the $8 million muon upgrade project, while the Arizona team is presently building the level 1 muon trigger. Johns said one of the more important aspects of the upgrade is involving students in the cutting–edge work. He said the Arizona group has a good record of including undergraduates at DZero, adding that it is important to him that students are exposed to experimental particle physics at a young age.

"Over the last four years, I have had six or seven [undergraduate] students work with me," said Johns. "For example, two of them right now are doing simulations of some of the designs we have for the level 1 muon trigger. It's really an important aspect of research."

Shupe is also immersed in DZero upgrade work. Among other tasks, he is the co–chair of the Run II graphics committee for DZero, which is developing the next generation of event displays.

Kevin Davis is one of the graduate students working on analysis of Run I data and producing electronics for the upgrade. Davis said he plans on being around Fermilab for some time in order to see his work come to fruition.

"Working on the upgrade has gotten me interested in the hardware and wanting to see it operational," said Davis, during a recent interview in the DZero trailers.

KTeV

Arizona got back into the fixed–target business with the hiring of Cheu in 1996. At the University of Chicago, where he was a postdoc before coming to Arizona, Cheu worked at Fermilab on experiments researching CPT–violation and CP–violation, two theories that attempt to explain properties of particles and their antiparticle counterparts.

Cheu has continued this line of work by participating in the KTeV (Kaons at

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URA Renews Contract

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the document specifies the scope of the physics research and support structure, identifies key personnel appointments requiring DOE approval, details permitted costs and covers many administrative issues as well, such as property and patent rights, foreign travel and employees' salaries and benefits. URA and Fermilab managers said they support the contract reform efforts that DOE is fostering among its laboratories.

"I believe this contract is a step in restoring the partnership between DOE and the university community that served this country well in the first quarter century after the end of World War II," said Fermilab Director John Peoples Jr. "That partnership has frayed badly over the past decade, but under new leadership, including Cherri Langenfeld at the Chicago Operations Office, we have made a great deal of progress in restoring this valuable relationship."

Photo by Reidar Hahn

Andrew Mravca, head of DOE's Fermi Group (left), and Fermilab Associate Director Bruce Chrisman discuss the proposed contract in May 1996.

Contract Highlights

Those familiar with the document said the renewal is similar to past contracts except for one fundamental change—the addition of performance criteria and measures. These measures affect nearly all areas of the Laboratory, and include agreed–upon standards for Laboratory administration.

The contract specifies two basic types of performance measures: scientific and administrative. If, for example in the scientific category, the contract specifies 3,410 hours of fixed–target operations in FY 1997 and Fermilab reaches 90 percent or more of that goal, the Lab gets a rating of "outstanding." 80–89 percent is excellent, 70–79 percent is good, 60–69 percent is marginal and less than 60 percent is unsatisfactory.

On the administrative side, the new contract gauges how many procurement actions are awarded through a competitive process; 70 percent or more gains an outstanding rating, 60–69 percent is excellent, 50–59 percent is good, 40–49 is marginal and less than 40 is unsatisfactory.

At the end of the fiscal year, the lab receives an overall rating for the combined science measures and a separate overall rating for administrative measures. If either the science or administration rating drops a notch from the prior year's performance, URA may lose some of its administrative fee. If Fermilab moves up in either of the two categories, the Lab must maintain that level in the future. (Future *FermiNews* stories will detail more of the performance measures in the contract.)

Some key reforms that DOE added to the contract were recommendations from a recent Energy Research Laboratory Procurement Report. Martha Krebs, director of Energy Research, commissioned the report to find ways to make the procurement process and other business dealings less burdensome on the ER laboratories. The report was well received at the laboratories as a step toward more efficient business practices and less bureaucracy, which save money and time, according to Andrew Mravca, head of DOE's Fermi Group. Jim Miller, also of DOE's Fermi Group, said most of the report's recommendations were incorporated in the new contract.

Another area of change affects fines and penalties. In the past, fines incurred by the Laboratory were an allowable cost; however, the new contract makes fines and penalties unallowable costs under many conditions, forcing URA to pay from its funds. This change puts more liability than ever before on URA and the Lab's shoulders.

Negotiating Process

DOE provided a draft contract to the URA / Fermilab negotiating team in May, and the team reviewed the contents. The two sides sat down at the table for the first time in mid–July. Bruce Chrisman, Fermilab associate director, said he remembers the timing well, as that was the first day of the 100–year rains in the Fox Valley. During the course of the talks, the two sides would bring in "functional" experts to address specific parts of the contract. These experts helped shape the document in their areas of expertise.

"All in all, it was a productive... atmosphere. Negotiations took longer than in the past because of the changes" toward performance–based measures, said Chrisman.

Not only did the changes affect the length of the negotiations, but also the strategy. Many of the "line–item" points of the contract were negotiated in parallel with the main talks. Since the proposed performance–measures affected specific areas or functions of the Lab, the DOE and URA/Fermilab negotiating teams sent representatives to those areas or functions to get opinions from the Fermilab staff members "in the trenches."

Jack Pfister, Fermilab assistant director, and Paul Philips, from DOE's Fermi Group, visited numerous areas of the Laboratory and solicited comments and recommendations on the proposed measures from the people who actually do the jobs. Based on the staff recommendations, Pfister made counterproposals to Philips and the two negotiated the fine points. The negotiation representatives would then bring their recommendations to the larger table as they reached compromises. This strategy proved extremely efficient, saving valuable time and forcing the negotiations to involve those most affected by the contract—the Fermilab staff and users.

"Clearly, the negotiating teams were a part of this process, but the recognition for the work [on the fine points] goes to Paul Philips, Jack Pfister and the cast of thousands that reviewed" the points, said Chrisman.

After about two months of negotiations at Fermilab, the two teams reached a tentative agreement on the contract. DOE then went into its internal review process. The local negotiating team first presented the draft contract to Langenfeld at the Chicago office. After various reviews, the Chicago office passed it on to DOE headquarters in Washington, D.C., where it passed through more reviews. Contract changes flowed out of Washington, where the URA/Fermilab and local DOE negotiating teams addressed each revision as it arrived from D.C. Negotiators said there was some disagreement about this strategy, but in the end it proved successful, according to Chrisman.

DOE was also busily working on the contracts for the Princeton Plasma Physics Laboratory in New Jersey and Ames Laboratory in Iowa, along with Fermilab's document. The Princeton contract was signed the day after the Fermilab ceremony, and Ames received their signatures two days later.

Many people at DOE, URA and Fermilab praised the negotiators. Maurice Glicksman from Brown University led the URA team; other members included Chrisman, URA Corporate Counsel William Schmidt and consulting counsel Richard Hames from a Seattle–based law firm. DOE sent a team to the table led by Mravca, Miller, John Chapman and lead counselor Alan Handwerker.

"A lot of people from DOE, URA and Fermilab worked very hard on this contract. With that kind of cooperation, we are making good progress toward the objective of placing more responsibility where it belongs, on URA and the Laboratory management," said Fred Bernthal, URA president. "Maurice Glicksman, of Fermilab's Board of Overseers, deserves special thanks for service above and beyond the call of duty, working on this contract for long hours and for very, very low pay." ■

Arizona

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Photo by Reidar Hahn

Elliott Cheu works with KTeV hardware at Fermilab.

the Tevatron) study, which is focusing on particle interactions that lead to the observed predominance of matter over antimatter in the universe. The asymmetry between matter and antimatter—the fact that our world seems to be made mostly of matter, despite the fact that matter and antimatter are produced equally when photons pair produce—may hinge on CP–violation. Experimenters are pursuing the origins of CP–violation in the decay of kaon particles.

Specifically, Cheu is working with the software for the experiment, including the programs used by the scientists to reconstruct events. The Arizona assistant professor has also built a hardware trigger processor, which selects neutral energy events.

After KTeV, Cheu said he may turn his attention to ATLAS—one of the detectors planned for the Large Hadron Collider at CERN—where Rutherfoord and Shupe have been developing the forward calorimeter and working on radiation background calculations and jet resolution calculations. The professors' initial calorimeter work at CERN was intended for the Superconducting Supercollider experiment in Texas. However, when Congress canceled the SSC in 1993, the Arizona team proposed doing similar work for the CERN experiment, and ATLAS managers agreed. Arizona's detector development on the Swiss—French border continues today, as Rutherfoord directs most of his energy there. Shupe, however, splits his time between ATLAS and DZero—a challenge that he says is demanding but still enjoyable.

"They turn out to be similar in some areas of calorimetry and QCD physics," said Shupe. "There is a common physics thread." ■

Photo by Fred Ullrich

Main Injector Update

Each dipole, or bending, magnet for the Main Injector, Fermilab's newest accelerator now under construction, requires laminations that measure 11" x 30". When all the magnets are complete, the lamination stamping machine, shown at left, will have made a total of 2.5 million of these precise laminations. The stamping process takes place at Electro Metal Products in Skokie, IL. The three–year contract is 90 percent complete and will eventually consume 150 million pounds of steel.

Magnets, Part II

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A section of niobium titanium superconducting cable with its strands frayed at the end for visibility.

erate its own field. But when removed from the field, it loses most of its strength, although there is usually some residual magnetization left over. Certain materials, however, remain highly magnetized even when removed from the original magnetizing field. These materials vary widely in magnetic strength and cost; one of the more inexpensive materials is a ceramic called strontium ferrite. Ferrite magnets are commonly found in stereo loudspeakers and in motors that operate power windows and power locks in cars. And soon, accelerator personnel at Fermilab will use ferrite magnets to steer protons and, perhaps, even antiprotons.

Although not needing a power supply is clearly an advantage, it also presents a limitation, since the field in a permanent magnet is not variable. Magnet builders can precisely adjust the field during the manufacturing process; however, once a magnet of this type is built, it's hard to change. But there are several applications where fixed-strength magnets are useful. One example is in a transfer line, where the beam travels at a fixed energy from one accelerator ring to another. There are many transfer lines at Fermilab, and more are planned. For instance, once the Booster Ring has accelerated protons to an energy of 8 GeV (eight billion electron volts), the beam must shift over to the new Main Injector ring, where it will be accelerated to higher energies. Fermilab will build this long transfer line connecting the Booster to the Main Injector using more than 100 permanent magnets.

Another possible application of permanent magnets is in a storage ring, a ring that circulates beam at a fixed energy. Such a ring might store antiprotons, as in Fermilab's proposed Recycler Ring. Fermilab accelerator personnel can't store antiprotons on a shelf in the stockroom; when antiprotons and ordinary matter come in contact with each other, they mutually annihilate, resulting in a very short shelf life. A better way to keep a supply of antiprotons handy is to circulate them in an ultra-high-vacuum pipe through a ring of magnets, so that they go round and round for hours until needed. Fermilab has been doing research and development in order to learn how to meet the precise tolerances required for storage rings using permanent magnets. ■

Chez Léon

MENU

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

Wednesday
January 15

Eggplant Rolls with
Two Cheeses
Garden Salad
Lemon Cheesecake

Thursday
January 16

Black Bean Soup
Barbecued Baby Back Ribs
Sauteed Collard Greens
Rice Pancakes
Tequila Lime Pie
with Banana Whipped Cream

Wednesday
January 22

Catfish Fillet in
Mustard Sauce
Vegetable of the Season
Sweet Potato Flan

Thursday
January 23

Chicken, Vegetable and
Shitake Mushroom Soup
Mongolian Leg of Lamb
with Red Curry Sauce
Vegetable of the Season
Pine Nut, Honey and
Anise Tart

LAB NOTES

Presidential Sports Awards

Wellness Works, sponsored by the Recreation Office, will again be offering the Presidential Sports Award Program. This program was developed as a means to motivate all Americans to be active in fitness-oriented activities. Earn the Presidential Sports Award in any one of 68 different sports and activities. If you qualify, you'll earn the right to wear a Presidential Sports Award emblem, receive a personalized Presidential certificate and have your name included on the President's Sports Award plaque, located in the new Medical Office.

To earn the reward: Pick up your information packet in the Recreation Office, WH15W. Packets will be available until January 17. Select your sport or activity. Keep a record of your participation on the log sheet. Turn in your completed log sheet to the Recreation Office no later than April 30.

If you participated in the President's Award program last year, you may participate again this year and earn an award in a different sport or activity from last year. Any questions, contact the Recreation Office, x2548 or x5427.

Romesh Sood

continued from page 5

conditions from the accelerator, rather than continuing to ramp at normal levels when no beam was present. Sood's suggestion saved an estimated $378,000 in annual electric power costs for the Laboratory. Indeed, in the penny-pinching Fermilab tradition, Sood is known as a cost cutter. "I guess I do have a tight fist," he says. Changes in emergency management under his direction yielded a $500,000 cost savings in the ES&H annual budget.

Sood looks forward to the challenge of working on big projects in the Technical Division. "I am a perpetual student," he said. "I want to go on learning. I have found that everyone at Fermilab has something to teach. I hope I can make a positive contribution to the team. I hope I can be useful."

Division Head Limon said he is pleased to be working with Sood again, after a 20-year interruption.

"Romesh and I worked together on the muon and neutrino beams when Fermilab was young," Limon said. "In those early days we had fun figuring out how to make the Lab work, and I gained great respect for his intelligence and dedication. I am delighted to have the opportunity to work closely with him again. We have a lot to accomplish in the next few years, and having Romesh on the team will be a great help in shaping the new Technical Division." ■

MILESTONES

BORN

Anna Claire Pavnica on December 13 at 1:08 p.m. at Mercy Center to Tom and Amy Pavnica (RD/ES&H).

HONORED

■ Steve Krstulovic, awarded the Energy Professional Development Award by the Chicago Charter Chapter, Association of Energy Engineers.

■ Cherri Langenfeld, recipient of the award for Energy Management Executive of the Year, from the Chicago Charter Chapter, Association of Energy Engineers.

■ Roy Rubinstein, elected Member of the IUPAP (International Union of Pure and Applied Physics) Commission on Physics for Development, at the General Assembly in Uppsala, Sweden in September.

RETIRED (in December of 1996)

■ David Austin, I.D. #1996 leaves
TSS/E, S & H group.

■ Richard Bingham, I.D. #875 leaves
PS/Electrical Production group.

■ Glenn Eggleston, I.D. #2873 leaves
TSS/Magnet Design & Fabrication/Tooling.

■ Baleriano Flores, I.D. #343 leaves
TSS/ Machine Shop, Wilson Hall.

■ Richard Graff, I.D. #1270 leaves
FESS/Operations/Electrical/AC.

■ Peter Gutierrez, I.D. #3861 leaves
TSS/ Magnet Design & Fab./Assembly.

■ John Hackemer, I.D. #2384 leaves
FESS/Engineering/ Civil, Tech. Struct.

■ Nancy Hughart, I.D. #6623 leaves
CD/Databases & Information/Database Support.

■ Richard Mahler, I.D. #722 leaves
AD/Controls/Hardware Engineering.

■ John "Jack" McBride, I.D. #2254 leaves
TSS/Magnet Design & Fab/Project Support.

■ Sam McGhee, I.D. #2242 leaves
FESS/Operations/Carpentry & Paint.

■ Walter Medernach, I.D. #1856 leaves
TSS/Magnet Design & Fabrication/Assembly.

■ Raymond Meisner, I.D. #661 leaves
TSS/Machine Shop/Machine Repair

■ Earl Nordmeyer, I.D. #1033 leaves
TSS/Machine Shop/Machine Repair.

■ William Ramstein, I.D. #3062
TSS/Machine Shop/Weld Shops.

■ Reid Rihel, I.D. #29 leaves
TSS/Magnet Design & Fabrication/Tooling.

■ Velvie L. Smith I.D. #158 leaves TSS/Magnet Design & Fabrication/Process Engineering.

■ Ray Solfisburg, I.D. #2195 leaves
BSS/Support Services/Property Management.

■ Harold Stahl, I.D. #4839 leaves
TSS/Magnet Test Facility/Power Systems.

■ David York, I.D. #2278 leaves
FESS/Operations/HVAC.

■ James Ziober, I.D. #579 leaves
AD/RF & Instrumentation/High Level RF.

CLASSIFIEDS

FOR SALE

■ 1996 Ford Ranger xlt (4x2), loaded, must sell, $13,500 o.b.o. (sticker price $17,800) contact conboy at x2946 or Quick Mail.

■ 1989 Ford-Taurus GL, AT, AC, power everything, cruise, tilt, new battery, belts, front and rear brakes, runs excellent, must sell, moving abroad. $2,200. Peter Ivanov, (630) 663-0311.

■ 1988 Mazda 323SE, 5 spd., 2 dr. hatchback, AM/FM radio w/ Cassette, 95K. $2,500. Call Karin at x4362

■ 86 Buick Park Ave., Sharp, 90k miles, navy 4 dr $2,800 Ph. (630) 859-8441

■ 87 Harley -Davidson XLH Sportster 883, 14K miles, excellent stock condition, brandy wine (color), $5,000. Call Ed, 630-690-1145.

■ 95 Ski Doo Formula "z" hi & lo windshield, reverse, saddle bags, 144 Picks, excellent condition $3,800 phone Ron Kellett 879-9499, or x3011

■ Nordic Track Pro. Never used. Has computer & reader. Paid $725, sell $500. Call 847-741-7539.

■ Kohler Whirlpool Tub, Heron Blue, 4' x 6' x 2' Deep with 6 water jets, never used, make an offer. Office desk metal black with 3 drawers (center, letter and file size) $50. Johnson outboard motor, 9 1/2 HP rebuilt in '95. $500 o.b.o. 16 ft. fiberglass duomarine boat needs work, hardware already removed and rough sanding completed $75.00 o.b.o. Two Drake satellite receivers (ESR 424 and ESR 24) for Cu Band, VideoCipher II and other older satellite equipment make an offer. Call Terry x4572.

■ Aurora/Fox Valley 3 Bedroom Townhome 20 minutes from Fermilab. Walking distance to Fox Valley Mall. Backs to lake - deck has great view. 1,700 sq ft, 3 bedrooms 1.5 baths, large pantry, new roof (1995). New paint, ready to move in. $92,000. Call Jeff, x8472 or (630)978-1717. Photos at http://www.candles.com/house/house.html.

LETTER TO THE EDITOR

I heard that the Xmas tree in the atrium is courtesy of NALWO. First of all, I would like to thank NALWO for donating the tree. I had heard that otherwise we may have had no XMAS tree in the Atrium at all!

I used to love to look at the huge tree that Fermilab previously purchased. I know that I would have given money myself toward a XMAS tree for the atrium. Based on this, do you think it would be realistic to take up a collection each year for the tree and buy one of whatever size the contributions would support?

I really miss the large tree, and if a lot of others feel the same perhaps this idea would work.

Joy Kyriakopulos
x8209

CALENDAR

JANUARY 12

Fermilab Folk Club barn dance at the Village barn from 7 p.m. to 10 p.m. Music will be provided by the Dead Mules. Tony Scarimbolo will be calling. The dances are contras, squares, and circles. All dances are taught and people of all ages and experience levels are welcome. You don't need to come with a partner. Admission is $5. Children under 12 are free. For more information, contact Lynn Garren, x2061 or Dave Harding, x2971.

JANUARY 24

NALWO POTLUCK, Village Barn, 5:30 -8 p.m. Enjoy the company, conversation and cuisine of lab employees, visitors and guests from around the world. Please bring a dish for 6 - 8 to share or contribute $3 per person. Babysitting and pizza for the kids are provided. At 8 PM the movie "The Postman" will be shown in the Auditorium.

ONGOING

English lessons, Thursdays 10-noon in Users Center; call Jeanette Antoniuk at 769-6518. German lessons (advanced conversation), Tuesdays 5:30 p.m. in Lab 7, 20 Neuqua; call Angela Jostlein at 355-8279. NALWO coffee mornings, Thursdays 10 a.m. in the User's Center; call Selitha Raja at 305-7769. In the Village Barn, international folk dancing, Thursdays 7:30-10 p.m.; call Mady at 584-0825. Scottish country dancing Tuesdays 7-9:30 p.m.; call Doug at x8194.

BENEFIT NOTE

Changes To Pension Plan Rules

The recent Small Business Job Protection Act of 1996 included pension plan provisions that affects all employers and employees. Several of the provisions are especially important to employees of not-for-profit organizations.

Under current law, active employees are required to take a minimum distribution from their pension plan no later than April 1 of the year following the year in which they attain age 70 1/2. Under the new law after December 31, 1996, that rule will apply to Individual Retirement Accounts and employees who are 5-percent owners (which should not be an issue to not-for-profit organizations).

Under current law, employees of not-for-profit organizations can only enter into one salary reduction agreement per calendar year. The new law effective immediately allows multiple salary reduction agreements during the year. This means employees can change their Supplemental Retirement Account contribution amounts more than once a year and can stop and restart SRA contributions more than once a year.

Under current law, employees can use five-year-forward income averaging on eligible lump sum distributions from qualified 401(a) plans. Under the new law, five-year income averaging will not be available after December 31, 1999.

The remaining changes in the law affect plan administration. The aim is to reduce administrative burdens placed on plan sponsors.

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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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