Minutes of February 5th Users' Executive Committee Meeting:

Present: Bertram, Finley, Gottschalk, Hagopian, Tanaka, Trischuk
Video: Artuso, Hughes, Messier
Apologies: Alton, Bloom, Nguyen, Rolli
GSA Representatives: Clark, Copic

Chair Trischuk called the meeting to order at 9:00 AM.

Subcommittee Reports:

Progress on the Washington D.C. Trip:
Schedule of visit:
March 15th: Arrive in Washington.
March 16th: 9AM meeting at URA, Congressional appointments for rest of day.
March 17th: more Congressional Appointments.
March 18th: OMB and OSTP meetings in the morning, DOE/NSF meetings in afternoon.

The UEC will be represented by Artuso, Gottschalk, Hughes and Trischuk at the OMB and OSTP. Hughes will coordinate the DOE visit while Artuso will coordinate the NSF visit. Preliminary appointment assignments have been made and will be finalized.

Users' Meeting:
Final dates of the meeting are June 8-9th.
Robin Staffin (DOE), Joe Dehmer (NSF) and Pat Looney (OSTP) have confirmed their plans to attend the meeting. Invitations to other dignitaries are still in progress.
The contract for the catering for the dinner on the 8th has been signed.

The Tollestrup Awards committee are seeking nominations. See the website at:
http://www.fnal.gov/pub/forphysicists/fellowships/tollestrup.html

The Users' Meeting program also lists PhDs awarded through the year. Please be sure that recent graduates are registered in the Fermilab PhD database.

Roadmap to the Meeting:
March: Solidify program, determine physics speakers, produce first draft of poster, setup registration website.
April: Organize program

It was suggested that a representative of the University Accelerator Collaboration Committee given a talk at the meeting. Sascha Kopp will be contacted regarding this.

Meeting with Fermilab Director Witherell:

At the Board of Overseers meeting, I reported that the Tevatron integrated 342 pb^{-1} in FY 2004, with a peak luminosity of 10.2×10^{31}, compared to 4.9×10^{31} in FY2003. Following the shutdown, we have obtained record luminosity in six weeks, with routine peaks at greater than 10^{32}. We have integrated 86 pb^{-1}, ahead of the design goal of 80 pb^{-1}. Other operational changes included regular mixed-source shots, slip-stacking for pbar production, and slow extraction for MIPP and test beams. Pbar stacking has hit a new record of about 15×10^6 pbar/hour, though this needs to increase significantly to achieve the FY2005 goals.

The endgame for NuMI has gone very well. On the fourth pulse of the horn, neutrinos were observed in the near detector, achieving CD4 in January 2005, a goal set more than three years ago. Commissioning will continue in February, with the goal of steady operation at 2×10^{13} protons-per-pulse in March.
MiniBooNE is on schedule for 5.1-5.7×10^{20} protons on target by the end of FY2005, with the target of a first major result in the fall of 2005.

BTeV: Following the positive Lehman Review, the 2006 plan has a 5 million dollar increase to fully fund BTeV. At this point, however, I do not know what the FY2006 budget will look like. In 2010, BTeV, NuMI, and the RSVP program (MECO and KOPIO) are the only high-energy physics experiments scheduled to be operating in the United States.

The FY2005 goals for Fermilab in the collider program are to deliver 0.5 fb^{-1} to each Tevatron experiment, for 1 fb^{-1} total, commission electron cooling. We hope to deliver more than 5×10^{20} protons on target to MiniBooNE , bring NuMI to 2×10^{13} protons-per-pulse and start the Proton Plan. Overall, we hope to operate the experiments reliably, analyze data in a timely way and produce results.

The plan for the budget is to redirect funds for the NuMI project, LHC and the CDF/D0 upgrade to SCRF research, the LARP/CMS research program and MINOS operations. We also hope to start on the proton plan to increase Booster and Main Injector proton output and to start on BTeV construction. The FY2005 budget for Fermilab is $291 million dollars, up 1.2%, while HEP as a whole is up 0.3%. It is important to keep in mind that this corresponds to a 6 million dollar loss after accounting for inflation, and a total of $120 million loss over five years.

The field has faced a 25% cut over a decade after accounting for inflation according to the employee compensation index (more appropriate than consumer price index when there are few construction projects). This year, we expect the high energy physics budget to be approximately flat, which is probably better than the rest of the Office of Science. However, one must keep in mind that while other areas of the Office of Science has seen recent increases, high energy physics has not, forcing difficult decisions on whether to invest in the short or long term future of our field. With a modest increase in funding (15 million dollars, 2% increase) we could do both.

Postscript added in response to FY06 budget:

The FY 2006 budget request was even more difficult than expected for Fermilab and for particle physics.

For High Energy Physics at the DOE the budget request is $714 million, about $22 million, or 3%, below the FY 2005 appropriation. The budget request also announced the decision to terminate the BTeV project in response to the budget constraints. The BTeV project had passed all of the physics and technical reviews conducted by the Office of Science before the start of a project with flying colors. This was a particularly difficult decision for everybody who has been working so hard and effectively on BTeV.

On Thursday, February 17, I held three meetings in the Ramsey auditorium to address the entire Fermilab staff on the future of the laboratory. I said that in light of the BTeV decision, we would be working quickly to adjust the Fermilab long-range plan to bring along further elements of the future program more quickly. I also said that I expected to announce a program of staff reductions very soon.

I concluded with some positive remarks about the future.

1. Fermilab today has the best operating program in particle physics of any laboratory in the world.
2. We are doing well at every aspect of our scientific program, and that is recognized at the Office of Science.
3. Everyone in a position of authority over HEP recognizes that Fermilab will be the site of accelerator-based particle physics in the U.S. starting in 2009.
4. The Office of Science recognizes the need to develop a strong future for HEP, and that means a strong future for Fermilab.
5. Fermilab is central not only to the future program of particle physics at US accelerators, but also to the US program at the LHC and in particle astrophysics. This broad program ensures a base of support for the laboratory.

Pier Oddone and I will be working closely to adjust the plan for the future and to communicate it to the Fermilab community.

Update on Linear Collider (Steve Holmes):

Where does Fermilab see itself in the ILC?
With the NLC, Fermilab considered its expertise in large-scale technical projects and thought that the linac would be a good place to contribute. Fermilab produced X-Band structures which were sent to SLAC and tested with success. Even prior to the technology decision, Fermilab's Technical Division started to assemble a team that could provide North American leadership on the linac regardless of the outcome of the decision. Following the decision, there is broad consensus in the North American ILC community that this indeed is the case. Fermilab is also involved in other aspects of the ILC, including the damping rings (with Cornell and Argonne) and linac beam dynamics. In addition, northern Illinois offers an ideal site for the ILC, though it would not fit in the current boundaries of the Fermilab site. Collaboration with Argonne is strong and we are conducting studies of possible sites.

In Illinois, the RIA Task Force has been set up to try to bring RIA to

Argonne. The task force is aware that the ILC and Proton Driver also represent opportunities to bring a major research facility based on superconducting RF technology to Illinois.

The Global Design Effort for the ILC is imagined as a distributed effort, but there is a Central Design Team that will coordinate the effort. The Central Design Team is currently searching for a director; there will be a report from the search committee at the ICFA meeting next weekend. There are also bids to host the Central Design Team (including a bid from Fermilab). An evaluation committee to determine the suitability of each site has been set up.

The director of the Central Design Team will be chosen first and will help decide where the Team will be headquartered. We should know the decision by the end of March.

On another front, the visa issue, considered critical for the US to host the ILC, seems to have gotten much better according to recent studies.

What is the status of SMTF (Superconducting Module Test Facility)?
The EOI for the SMTF was submitted in December, after which the Director encouraged the signatories to submit a full proposal. Kovar and Staffin from the Department of Energy were briefed. We have started cleaning out the Meson Labs to make way for the facility. The proposal is expected to be received in mid-February.

This year, funds for moving ahead with the SMTF must come from the existing budget. In FY05, we will have about $7 million dollars for the effort. Altogether, SMTF is a $100-150 million facility, so securing funding is a major issue. Assuming a flat-flat budget, we hope to increase funding Fermilab's contribution from $7 to $9 million dollars, but more is needed. The Proton Driver and ILC projects will be the source of money for the facility as far as high energy physics is concerned; other fields are expected to utilize the SMTF for development and testing of SCRF technologies relevant to their own facilities if/when they conclude this is the most effective use of their funds.

There are many opportunities to collaborate in the SMTF. The RF structures and cryomodules are expected to be mainly a Fermilab/JLab/Cornell effort, while RF infrastructure will be done jointly with SLAC and others. There are 13 domestic and 4 foreign institutions listed on the EOI.

For the university-based groups, it is important to note that the universities have been heavily involved from the very start, even though some are not historically involved with accelerator technology. UPenn has taken interest in the low level RF and controls, while NIU is interested in the instrumentation and sources. University groups interested in participating may wish to contact Nigel Lockyer at UPenn and Gerald Blazey at NIU.

As for the Proton Driver, the cold decision was good for FNAL, since it allows us to align the Proton Driver and ILC efforts. The SMTF plays a key role in coordinating the R&D effort, allowing Fermilab to manage it as one effort. The Proton Driver is now starting the CD0 process, where mission need is established, that is, that the facility is needed for the Department of Energy to fulfill its mission. Information on the Proton Driver has been supplied to the DOE in response to their solicitation of requests from the laboratories for possible future facilities. At this stage, the physics is more important than the technical aspects. In this respect, the case centered around a high intensity neutrino program has been helped by the recent APS DPF/DNP neutrino study. The process is proceeding in two parallel paths, with Steve Geer coordinating the physics case (to be reviewed in three weeks) and Bill Foster coordinating the conceptual design for the linac (a Director's review is scheduled for March 15-17th). The Department of Energy Program Review in May will look at these programs (among other things).

Elvin Harms: Antiproton source

Shutdown work on the antiproton source focused on changes necessary to improve stacking rates:

1. Install motorized stands for debuncher quadrupoles.
2. improvements to debuncher injection region.
3. Alignment work.

During the shutdown, the scope of the work was expanded to include

1. Cord remediation: thanks to the DOE for providing money for this.
2. Fix arcing cavity.
3. Fixes in Debuncher-to-accumulator line.
4. Fixes in the accumulator flying wire.
5. Work on the AP2 beam stop.

This was an ambitious amount of work for the thirteen weeks of the shutdown.

Debuncher motorized quads:
During the shutdown an additional twenty quadrupoles in the debuncher were outfitted with motorized stands, adding to the existing ten already outfitted. Simulations identified which ones of the 114 magnets were most likely to benefit. The work was complicated as one needed to work around existing components, resulting in each installation taking 10 days.

Debuncher Injection region:
This has been a long standing bottleneck. The tuning space was increased by installing a modified injection septum, replacing a single SQC with two larger aperture magnets and installing larger beam pipes. Some components were also equipped with motorized stands so that positions could be optimized by beam alignment.

Alignment work:
The alignment work over the shutdown tied the pbar source into the Tevatron alignment network, as well as a relative alignment between the various beam lines. Analysis of the alignment data is in progress. Some of the components are in good shape; for example the AP1/AP2 lines are within one minute of their nominal 3 degree relative angle.

Debuncher-to-Accumulator Line:
The D-to-A line was likely to be limiting stacking rates: the three second transverse cooling time can be explained if there is an aperture restriction.
During the shutdown, an "as found" with a laser tracker was performed. As a result, several septum magnets were moved, and one replaced.

AP2 beam stop:
A vacuum problem developed last year, probably in the target vault.
The beam stop was found to be misaligned, most likely since the original installation in the 1980s. A temporary beamstop was installed. An inspection of the region showed a clear view upstream to the production target from the beam stop area.

Startup:
We reached normal stacking performance within two weeks of the first beam.
Luminosity in the Tevatron was achieved within 10 days. We have had record stacking performance (14.97x10^{10}/hour) in the last month, but still well short of our goal. Many of the FY05 stacking goals (zero stacking rate, normalized zero stack stacking rate, average stacking rate, etc.) have

already exceeded base goals and are now working towards design,

Prospects for Improvements:
The stochastic cooling system can currently handle the expected flux for increased rate and clear out the accumulator in 1.2 seconds. Benefits may be gained through:

1. Slip stacking
2. Cycle time reductions
3. Beam-based alignment resulting in bigger aperture and larger flux.

Current indications are that the pbar production efficiency (per proton-on-target) is somewhat lower with slip-stacked bunches than with conventional bunches.

We are currently developing the tools to make use of the installed components,
most notably the motorized stands. We plan to optimize injection into the debuncher and perform D-to-A line diagnostics parasitically during stacking
without resorting to reverse proton running. We also plan to develop tune-by-tune orbit tuning systems.

Short-term plans:
1. Reduce accumulator beam loss, particularly in the first few turns.
2. Explore debuncher aperture during stacking.
3. Reverse proton studies when possible: most time for AP2 vertical injection alignment. This will take 16-30 hours in at least 6 hour chunks.

Other Issues:
The pbar source must support regular day-to-day operations. We are regularly
solving problems and identifying incremental improvements to improve reliability. We have had 2 unexpected pbar failures this year. Last year, we had a 69 day stretch of uninterrupted operations.

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are needed to achieve the transfer rates needed

Transfer Frequency:
Recycler shots can increase peak luminosity, but not integrated luminosity
for long stores (>30 hours). Faster transfer times from the Accumulator to the Recycler are needed to achieve the transfer rates needed to benefit
from improved stacking rates and electron cooling. This means that shot setup
times must be less than 30 minutes when e-cooling is in operation, with the
goal of 1 minutes in the frequent transfer era. Currently, shot setup takes
about two hours. By upgrading the to ramped power supplies, we will not need
reverse proton tuneup of the transfer line.

In summary, there have been recent improvements in the stacking rate mainly due to slip stacking. We hope to increase the rate further by decreasing cycle times and improving debuncher-to-accumulator transfers and the injection aperture and flux. There is a long list of things which we need to pursue, all of which need to be completed before we see significant benefits to stacking.

Report of Outreach Committee: Mark Messier
I have been investigating where the UEC can uniquely contribute to outreach efforts. It appears that the coordination of volunteers on a regular basis for outreach opportunities is still the best prospect. The World Year of Physics may also bring other opportunities.

Report of the Graduate Student Association: David Clark, Katherine Kopic.
All five GSA officers will be attending the Washington, D.C. trip. We are currently organizing the New Perspectives conference. We are compiling a list of speakers to invite to the conference, organizing talks, and also considering inviting graduate students from other laboratories to attend. The GSA will also update the "Guide to Life." We will move it to an offsite website, so that the information content is more useful, particularly regarding recommendations about local businesses and resources. We also are looking into separating out the "market place" aspect of the fnalgrad mailing list, so that wanted and for sale advertisements will be directed to this website rather than the mailing list.

Next UEC meeting: March 5th, 2005.
Future dates: April 9th, May 14th.