

From: Sharon Hagopian 850-644-4777/630-840-8384

Date: Mon, 22 Dec 2003 11:58:24 -0500 (EST)

UEC Minutes -- December 13, 2003

Present: Bloom, Garcia, Gottschalk, Groer, Hagopian, Messier, Tanaka,
Trischuk, Tschirhart, White, Zimmerman (apologies: Rolli, Sheldon).

Subcommittee reports:

Non US issues: Groer reports that it was recently decided that Chinese and Russians will now only get single entry visas. Chinese citizens were already in this situation. Citizens of both of these countries will undergo new security checks when they apply to re-enter. While this is advertised to be a 6 week process, the FNAL experience is more like 12 to 20 weeks. This could be because what we do is associated with sensitive technologies -- which heightens scrutiny.

DC trip: Zimmerman has arranged a phone conference with SLAC later in the meeting. Planning a joint preparation meeting at SLAC in late January. March 24-26 is the target for the DC trip. A May date is also possible depending on the legislative schedule. Typically this lasts 2.5 to 3 days. Include visits to DOE/NSF.

Outreach: White has been talking with a teacher from the Chicago Private Academy who wants to get Fermilab involved with Chicago Public Schools. Thinking of having scientists visit the classroom, take advantage of FNAL materials and/or have a point of contact for email exchanges. Still trying to organize a meeting with the FNAL education office. UEC members are visiting the Museum of Science and Industry with a 'booth' and talking to museum visitors during high attendance periods.

Users Meeting: Subcommittee will meet in early January. Advised not to start booking people before the new year. But the auditorium is booked for June 3/4, 2004 and Chez Leon is ready to cater the meeting.

Dave Finley (Technical Division): Proton Team Report

Can find the draft report at:

www.fnal.gov/directorate/program_planning/studies/ProtonReport.pdf

Can also find copies of the slides he showed at the meeting at:

www.fnal.gov/orgs/fermilab_users_org/finley_dec03.pdf

Charge was to identify user demands, establish goals for delivery of protons, modifications to the Linac, Booster and Main Injector that would be necessary to meet these goals, identify opportunities to collaborate with users and other outside institutions and suggest an organization to achieve all of the above. Committee formed in Feb 03, input from more than 30 people over the last year.

Ground rules: 1) Antiprotons will be needed throughout the next decade; 2) New Proton Driver replacing the Linac and Booster is not the only answer; 3) Individual ongoing activities will remain part of the plan if they are seen to make sense in an overall plan; 4) Physics prioritisation left to the Director.

Highlights of proton committee in the 11/18/03 Fermilab Today. Conclusions include: Need to find additional vendors for Linac power tubes; MiniBoone and NuMI can run at the same time; It should be possible to support Run II, NuMI and Fixed target at the same time; The accelerator division needs to plan for this and needs to find a way to collaborate better with other organizations (other labs and universities) to achieve this.

Showed a proton economics plot from the PAC meeting. Loss limits in booster have been preventing MiniBoone from getting more than 30% of their goal. Work in the recent shutdown was done to raise these limits. It is hoped that MiniBoone will now be able to get to the level promised in their approval. Booster has a 7.5Hz cycle limit that will be the next barrier which will come into play when NuMI comes online in FY05. Antiproton slipstacking will also increase the demand for protons but this is a minor perturbation.

Dave showed four pages of suggested actions that have been sent to the accelerator division to do things to control and reduce Booster losses and to improve the Main Injector's performance. Many of the suggested improvements cost significant sums and can probably only start after the long range planning exercise has concluded and established some relative priorities.

Booster activation vs. access to allow maintenance likely to continue to be the main limit on the number of protons. But it seems likely that NuMI, Boone, Run II and fixed target can run together. Increasing demands of neutrino programme will require modifications to the complex but it is not clear which ones are the most cost effective. Eventually a new Proton Driver will be needed.

The committee suggested that the generation of protons be better integrated into the overall lab plan and with an individual in place to establish priorities. A high level point of contact should be established to coordinate collaboration between the lab and non-FNAL institutions to achieve these goals.

Dave McGinnis (Accelerator Division): Run II Status and Studies

Copies of his slides can be found at:

www.fnal.gov/orgs/fermilab_users_org/mcginnis_dec03.ppt

Performance of the machine complex was improving steadily up to the September shutdown peaking at 6.5 pb^{-1} per week, PBar efficiencies above 60% were very promising. Running 90 hours per week starting stores at 40×10^{30} . These stores came from 130 mA PBar stacks. This is not up to design. Will require stacks of 170 or 180 mA that can be achieved with faster cycle rates in the accumulator.

Coming out of this shutdown there are no major pieces of equipment that remain to be installed. The issue is commissioning, which they will attack aggressively once reliable physics operation has been re-established. Also working on improving Tevatron reliability. Larger stacks appear when the store in the machine runs as long as possible. The goal is 20 hours. The distribution of accumulated store hours between failures is exponential with a slope of 42 hours. This translates into a probability that the store will continue for the next hour of 97.6%. Aiming for 20 hours \Rightarrow 1 out of 3 stores will end in failure. To get up to 99% reliability need to double the mean time between component failure needs to double. Mean life is currently about 5 years so achieving that kind of reliability will require improving component failure to 10 years. The gains here are realistically limited.

Luminosity increases will come from increased PBar stacks hence increases in the stacking rate. To do this the accumulator cycle time should drop from 2.4 to 1.7 s.

Goal for FY04 is 370 pb^{-1} , 285 pb^{-1} is the base. Last year delivered 240 pb^{-1} . There will be a 25% PBar tax where stacking time and antiprotons will be dedicated to recycler studies. This is the remaining piece of the Run II upgrade path. Planning to start at 5 pb^{-1} per week ramping linearly to 10 pb^{-1} week by the summer '04 shutdown. There will naturally be some commissioning period but expect to re-join the steady running curve by the end of January 04. They are currently re-establishing 'normal running, having achieved 20×10^{30} within a week of startup. Once back in steady state then start commissioning equipment installed during the 10 week shutdown. Although lumi has been low up to now it is promising that the PBar transfer efficiencies have been 70%. Stacks have been in the 70-80 mA range.

Recycler vacuum work has been a success. Emittance growth rate is a factor of two better than necessary for Run II upgrades. As we were speaking 60×10^{10} pbars with a lifetime of 700 hours were in the recycler.

Tevatron quench was an isolated incident triggered by an error in CDF pot motor control which caused a cascade of

other failures. Damage to collimators was impressive. Incident report to be released next week. Abort logic is being examined and may be extended to prevent some of the things that went wrong in this incident. Need to consider majority logic among beam loss monitors.

Machine study strategy: Only start if 140 hours of collisions in the previous two weeks; will occur twice a week, for short periods (8-12 hours); at least two stores between each study period; documentation of results before allowing further studies the same area. Maintenance still occurs at the discretion of the Run Coordination. The collider has now moved from a commissioning phase to an operations phase.

Jim Alexander -- PAC chair

Q: What is the current role of the PAC? A: It advises the directorate on physics programme issues. Consider incoming proposals and requests referred to them by the directorate. Sometimes this takes the form of discussion, comment, written evaluation and sometimes for approval of a new project. Meets three times a year fall/spring at FNAL -- shorter meetings, and for a week in June at Aspen -- considering more long range issues. They use input from other directorate sponsored or DOE sponsored review committees. Considering several proposals in December meeting -- mostly on neutrinos.

Q: How does the PAC see itself as actually doing the work outlined above in light of other constraints (financial/DOE oversight)? Is there any room to actually do these programmes in a competitive and timely way? A: Difficult to know because budgets are year-to-year and uncertain. However most of the current proposals are small in absolute \$. Are being careful because even small projects can set precedents. Believes there is good science to be done on a small enough budget that there is room to embark on some of these projects.

Q: What is the growing role of astrophysics in the PAC? A: There has been one person added to the committee this year which is natural as the lab already has a number of astrophysics projects.

Q: How can the users interact more effectively with the PAC? A: Email, phone -- not just proposals. Committee members are interested in getting feedback from the user community. He would welcome this input without having to solicit it.

UEC interaction with the search for a new director. Hagopian reports that our suggestion for the search committee have been received by the URA. The board of overseers is working expeditiously to find a search committee chair and will work with that person to flesh out the committee. The committee should be formed by early in the new year. The UEC should consider inviting the chair of the board of overseers, the chair of the search committee, or the URA president to an upcoming meeting to understand how the process will go from here.

Herman White: A Primer for the DC trip

The UEC travels to Washington, D.C. once a year to interact with the policy makers and governmental officials. These have been joint trips together with SLAC users organization members (SLUO) for the past three years. The visits put a human face on the science and its excitement for the people who make the funding decisions. It seems to help to tie our work to our educational mission. We try to make the policy makers aware of the value of the training and results we produce from our research.

Plan to contact: NSF, DOE, OMB, OSTP, White House Economics Council; House of Representatives (Science Committee, Committee on Energy and Commerce, Budget Committee, and the Appropriations subcommittee on Water and Energy,); Senate (Commerce, Science and Transportation Committee, Budget committee and the Appropriations subcommittee on Energy/Water) and the offices of district representatives of committee members. When talking to people, we should make a point to invite them to come and visit FNAL. Pictures help but there is nothing like seeing the accelerator complex and detectors in person and this gives additional opportunities to put human faces on what we do.

Need to brush up on the facts: Know how our work impacts the member's state/district; Never be negative about the political process; Do not assume R&D is an entitlement; Be familiar with the budget and how it pertains to our work;. Understand how the legislative process works.

Conference Call with SLUO members:

Gregory Dubois-Felsmann (chair of SLUO DC-trip committee), Yuri Kolomensky join us on the phone.

General plan is to start at URA headquarters and then fan out from there, visiting the various offices outlined by White. The second day involves further appointments and information gathering. Recently a third day has involved a visit to DOE (maybe also visit NSF this year) to share with them our impressions of our visits to the various offices. SLUO will send several people with previous experience in Washington on the DC trip as well as some first timers.

Plan a preparatory meeting at SLAC on January 31. Will have video conferencing available for those who can't participate in person. April Burke and Judy Jackson will attend.

Visit with Mike Witherell:

Made time to visit with us during a break in the PAC meeting.

Q: What is being done to prevent major quenches like the one 8 days ago? A: Investigation almost concluded and report to be issued next week. Further work to understand the Roman pot motor failure, but in addition they are working to get a quicker cleaner abort as a response. Establishing a written procedure on abort procedures. Test it with smaller stores first. Also reviewing the trigger logic for an abort. This was thought to be OK in the past but there are many more protons in the accelerator now than in Run I, and the damage to collimators is sobering. The conning tower failure, that necessitated a 10-day stop, is a known weak spot in the cryogenic system. They have been replacing them systematically when sections of the ring were warmed up for other reasons. Have used the 10 days to do PBar studies. These will be credited towards the PBar tax.

Q: What are the plans to recover the lost luminosity? A: The schedule had 2-3 weeks of down-time built into it and a turn-on curve. To that extent this has been anticipated. If we don't get another one in the next month or two we will be back on track.

Q: Future plans, projects, reviews coming out of the long range planning process? A: Montgomery gave an overview in a wine and cheese talk on December 12. The FLRPC will have a retreat in early January with the goal of merging the recommendations of the sub-committees. Their aim is to provide a report by February '04. This report will be discussed with the PAC. Should plan to discuss it at the Users meeting in June. Have already been getting feedback from the users community in the open sessions. There is a parallel process at SLAC that has already reported out.

Q: CKM was still in the long-range schedule for the lab. What is the plan? A: The FLRPC was focusing on a longer timescale. The lab will have to work out the future for the CKM experiment independently.

Q: Will the proton driver not be considered for another 10 years, as implied in the DOE Office of Science 20 year facilities plan? A: The proton driver could get going in the shorter term. Will need to sharpen the physics arguments if we are going to be able to sell any bump in funding that this might require.

Q: Would a cold linear proton driver be impacted if the LC wise-persons decided that a warm technology was more suitable? A: There are other advantages of pursuing super-conducting RF. ANL is considering Rare Isotope Accelerator (RIA) based on a similar technology. So the linear collider is not the only application of cold RF technology. The lab will develop the proton driver design independent of a linear collider technology decision. The LC technology decision might well determine what part of the LC we work on. If the LC technology decision was cold and it might make more sense for FNAL to pursue building the linac. If the LC decision was warm then

FNAL might big on a different part of the machine. For every laboratory, including DESY, FNAL, KEK and SLAC, which parts of the LC they work on will depend on what the technology is.

Q: If RIA goes ahead would FNAL collaborate on superconducting RF with them? A: This boils down to a question of when collaboration beneficial. There would need to be a clear benefit to HEP if FNAL were to get into such a collaboration. Similarly, medical therapy machines might benefit from a collaboration on the front end of a proton linac of 100 MeV or so. But again the collaboration would have to be rooted in benefit to an HEP application.

Q: What is FNAL doing to work towards a linear collider? What are the chances of it coming here? A: FNAL scientists have been working on the North American warm/cold -- cost/site document -- 500 pages to be released soon. This work is going on under the auspices of the USLCSC. Need to increase the visibility of the machine and detector study work going on at FNAL. Planning a position in the directorate that will be a single point of contact for linear collider work. Accelerator R&D in this direction is pending a technology decision. Makes most sense after the international warm/cold decision. The budget for accelerator R&D has been hurt by flat-flat budget overall. The LHC luminosity upgrade work gets support from project funds (from outside the laboratory). Money for the proton driver could be found from the lab budget depending on the outcome of the FLRPC. There is some hope of getting additional support from non-FNAL DOE support.

Q: Did an organizational change accompany the re-naming of Beams to Accelerator division? A: No. However there have been several important changes within the accelerator division over the last few months. An Integration group has been formed to address the challenges of optimizing the performance of the complex. This is well matched to the needs for Run II but perhaps less well matched for accelerator R&D. We will also have to form groups for the major R&D efforts.

Next meeting: January 17, 2004