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UEC Minutes -- May 22, 2004

Present: Bloom, Bose (GSA), Garcia, Hagopian, Rolli, Tanaka, Tschirhart,
Trischuk, White, Zimmerman. Apologies: Gottschalk, Groer.

Report on April HEPAP meeting (Sharon Hagopian)

Sharon reported on the talks that were given at the HEPAP meeting. Robin Staffin (DOE) spoke about the discussions that were underway among the different funding agencies to establish some consensus on how they could fund the construction of a linear collider. NSF representatives discussed their HEP budget crunch. Barry Barish reported on the result of the DOE/HEP Visitors Committee highlighting manpower shortage in their office precluding them from doing extensive strategic planning and oversight.

The LHC status was reviewed by Abe Seiden. As machine turn-on approaches there is the risk that funding cuts will jeopardise physics readiness of Americans at the LHC. The re-direction of effort from the Tevatron collider programme to the LHC is being discussed widely. The LHC experiments are pushing for a bump in support for students and postdocs because the Tevatron experiments naturally will have their most interesting data when the LHC experiments are most in need of manpower for commissioning and early operation.

Also discussed presentations from the Cosmos committee. HEPAP members had some objections to the Cosmos committee report -- that it didn't include enough astrophysics. There was also some concerns expressed about the tabular summary of the nine most important questions in particle physics and how major facilities are addressing these nine questions.

There are four HEPAP meetings each year. Should try to have a representative from the UEC (chair or designate) to follow these discussions. At the very least should get a report from each meeting as some members of the FNAL community will always be present.

Status of the Laboratory (Mike Witherell)

Have now been getting feedback from the flurry of spring reviews. The operations review was very successful. The operations review was the first of its kind, reviewing the operations of the entire laboratory, and the report from that was very positive. On May 6, Ray Orbach, the head of the Office of Science at the DOE was at the Lab for the On-site review. This is a review by the Office of Science, rather than the Office of High Energy

Physics. It was clear that he was enthusiastic about the linear collider and about the lab's plans to increase its effort in that area. There was a celebration at the LHC magnet factory marking the shipment of the first quadrupole assembly to CERN. Orbach spoke at that event and toured the assembly area in the Industrial Buildings.

The BTeV CD1 review went well in technical, cost and management areas. The schedule was not in a state ready for a baseline, however the review certified that the schedule was limited by the funding profile and not technical readiness. It also estimated the amount of delay that would be necessary to have sufficient float in the schedule. The project is making a schedule that matches the late funding profile that will be reviewed by us on May 27-28. It will include staging about one half of the EM calorimeter and some trigger bandwidth, but preserving their large advantage over LHCb for the physics topics in which LHCb is competitive. The detector would be completed 9 months later. The PAC will review the physics timeline for this scenario at the meeting this summer. The PAC review will go to P5 for them to comment. The time for the CD2 review is not yet set.

The collider has been maintaining the pace laid out for the base luminosity goal for FY04. The reliability has not been what it was over the winter so some of the gains from earlier in the year have been eroded. On the plus side the Accelerator division has changed the optics and are now getting instantaneous luminosities comparable to the records earlier in the year with much lower stacks of anti-protons. If they can tweak these optics to operate more stably and the spring/summer weather is kinder a flurry of new record instantaneous and integrated luminosities may be on the horizon.

Mini-BooNE is doing well. Proton currents are up but losses are up a little bit more. The Booster group is working to understand the losses which currently limit the number of protons that can be delivered. Booster reliability has been very good.

The Long Range Planning report will be released soon. The Director will present his reaction to the recommendations in this report (to the Linear Collider R&D group, the LHC Physics Centre and the Proton Source) at the Users Meeting in his talk in early June.

Q: Any news on the FY05 budget? A: No, but for FY04 it looks like there will be some number of continuing resolutions, but it should be possible for the lab to survive this process completing the necessary shutdown work and resuming high efficiency operation on the accelerator complex late in the calendar year.

Q: Orbach is very positive on the Linear Collider. Will it be possible to translate this into action? A: The real way to phrase this is will this enthusiasm reflect itself in any good news in the FY06 budget. The answer is maybe, but it will run into many projects that are starting up in the Office of Science and perhaps a very tough budget for the Office as a whole.

Q: What are the plans for reviews in the next 6 months? A: Most of the big projects are in a phase where they are only getting

mini-reviews. NuMI and MINOS are 95% complete and mini-reviews of those will only be looking at the end game. The PAC will meeting in June at Aspen. They will look at Nova, the world-wide neutrino programme and the Lab's place in it. In addition they will review a modest astrophysics proposal and BTeV, as mentioned earlier.

Q: What is the emphasis of the current set of reviews of the University based programme and its ability to bridge the completion Tevatron programme and the onset of the LHC experiments? A: There is always a tension between completing a running programme and the need to construct and commission experiments for a new machine such as the LHC -- especially when the time scales for these activities reach beyond the lifetime of a postdoc or a graduate student. While these surveys are struggling to get realistic information they are an important input. The Director will get additional information from the Tevatron collaborations directly which will both be renewing their MOUs with user groups. The Lab will then have to see what it can do to fill the gaps and optimise the physics output from the experiments it is hosting. One initiative that is being touted to address this is the LHC Physics Centre at the Lab (see minutes from the April UEC meeting). This may help user groups address the problem of sharing postdocs between Tevatron experiments and LHC experiments. The experiments must also recognise that sharing personnel between experiments will occur and that they can no longer expect postdocs and students to devote 100% of their time to one experiment.

Progress and Status of the NuMI Beam Line (Peter Lucas)

There is now a movement to expand the use of the NuMI beamline beyond just the MINOS experiment -- that is scheduled to come into operation in FY05. He showed a map of the site, the MINOS near detector building beside the Lederman centre and its path from there to the Soudan mine in northern Minnesota where the MINOS far detector is complete and taking cosmic rays. He also showed the elevation view emphasising the steepness and length of the decay tunnel (1:6 grade) which was a major engineering feat. The extraction line from the Main Injector to the NuMI beamline was also tricky to install as the beamline comes off between the Main Injector and the anti-proton Recycler. All of the magnets for the NuMI beam line are installed. During this fall's shutdown only the extraction kickers remain to be installed.

Showed pictures of the target hall, including the target chase emphasising measures that were taken to mitigate impact on the water table. While no infiltration has been seen into the water table from other targets on site, this target is in the aquifer. There is more steel in the target hall shielding than in the near and far MINOS detectors combined.

Several experiments have been proposed to use this facility. The MINOS far detector has been completed for some time and the near detector is nearing completion. This experiment is the *raison d'etre* for the facility. MINERvA has been proposed to study neutrino-nucleus interactions. There is some concern that this

experiment might generate a muon-neutrino background in MINOS. The PAC will deliberate on this in June. The NOvA experiment is a long-baseline, off-axis neutrino oscillation experiment that will include a fine-grained calorimeter to observe ν_e appearance in a ν_μ beam.

Three other proposals are much less mature. The Soudan-II detector might be recommissioned and used to make unique measurements in conjunction with MINOS. CERN-Gran Sasso experimenters are considering using a site near the MINOS near detector to test and calibrate their prototypes. It also turns out that a much steeper inclination, but the same compass orientation, could deliver a beam to Tokyo or Beijing where an even further "far detector" could be sited.

One over-arching issue is providing sufficient protons to produce the neutrino fluxes required by the experiments. The MINOS proposal calls for 3.6×10^{20} protons per year. Until the advent of mini-BoONE this represented all the protons that had ever been accelerated at the lab. It still requires more than doubling the number of protons that the complex can currently accelerate. Significantly more efficient use of the the Main Injector will be necessary. About 1/7 of the MI buckets will be dedicated to anti-proton production for the Collider while 5/7 will be used to generate NuMI beams. The remaining 1/7 of the buckets are necessary for the various kicker ramps to extract beam cleanly to the anti-proton target and NuMI.

Q: Is there any consensus on the ability to run miniBoONE at the same time a MINOS/NuMI? A: The limit is still the loss rate and activation in the Booster. Should really have a talk from the Booster early in the Fall to follow up on progress over the summer and plans for the shutdown.

University-based Program and HEPAP (Chip Brock and Sekhar Chivukula)

They are university representatives (along with Hank Sobel) nominated by the APS Division of Particles and Fields. They gave talks at the recent HEPAP meeting focusing on the issue of manpower in the field as we bridge the transition from Tevatron experiments to the LHC. Copies of their slides are available at:

<http://www.science.doe.gov/hep/AgendaApr04.shtm>

They were invited to repeat those presentations to the UEC to enlist our help.

Sekhar Chivukula began by explaining how he tried to raise the awareness of the funding agencies of the consequences of the erosion of base support for University programmes. "User" might not be a full description of what University researchers do -- they play an integral role in making the experiments (and sometimes even the machines) possible. This group has also tried to make some assessment as to whether the University based resources are matched to the research roadmap that the community has so successful at establishing and has emphasised the

transition from ongoing programmes at FNAL and SLAC to the LHC. The goal was to initiate a discussion of these issues and assemble some relevant statistics on the resources available.

Q: Is there really evidence that the DOE/NSF didn't successfully optimise their resources vis-a-vis the research road-map? A: It is too early to tell whether there was sufficient planning for the road-map. The survey was undertaken to gauge this and it remains preliminary with large uncertainties. The evidence from this exercise was that there might be a trend that is worth studying with more precision. The goal of this first round was to determine whether this subject deserves further study.

The LHC experiments have addressed physicist effort in more detail than has been attempted in the past by polling US ATLAS and US CMS groups as to their plans for dedicated personnel to the projects. What has not been done is assessing the running experimental programs for their needs for personnel. In order to prepare for this discussion, DOE and NSF were both asked to provide some histories of funding as well as demographic information in order to get a picture of trends. Postdoc funding/numbers are particularly relevant. The ability of the agencies to respond to such inquiries is apparently limited. DOE responded after considerable internal effort. NSF found it difficult to respond in detail.

Chip Brock continued by emphasising the breadth of the running programme, despite the fact that it might appear mundane relative to the excitement we have to generate for new initiatives in order to make them a reality. There is a need to emphasise that we do not operate like the astronomy community where facilities 'spit out' data and university groups analyse it. The HEP community has been successful in attracting support to build and commission large facilities. Maintaining support to operate these facilities to harvest the data has been very difficult. To try to understand how this works now they undertook a first rough survey of running experiments (CDF, D0, BaBar and CLEO) as to their current (2004) allocation for post docs, students and faculty/lab staff to Operations and Data Analysis. In addition, future experiments (ATLAS, CMS, MINOS and BTeV) were probed for their 2004 allocations (where 'Operations' in these cases refers to commissioning and/or construction and 'Analysis' referred to Monte Carlo production). All of these experiments were then asked to project these needs through 2009.

Brock showed summaries of Faculty/Postdocs/Students, Foreign/US/USLabs, Operations/Total. Projecting out to 2009, the ramp up of LHC activities is clearly not mirrored by a reduction of effort at the facilities that continue to operate. He was reluctant to draw any numerical conclusion from this exercise and insisted that it has large uncertainties and known inconsistencies due to the few-week time during which the survey was made. Rather, he emphasized that the goal was to indicate whether there might be enough concern to suggest that further study might be useful. If, after a more thorough investigation, the field as a whole is lacking a few post docs, a fix might be doable and not very expensive (note: 10 post docs cost about \$1M).

He emphasised that this is a critical time when BaBar, CDF and D0 are all starting to mint new PhDs. If the field has a need for them as postdocs we shouldn't figure it out 2 or 3 years from now. At that point it will also be too late to have an impact the LHC programme. There is some consensus that the survey should be re-done to try to reduce the uncertainties from the current level of +/- (20-25)% to closer to 10%.

Q: Do you have any statistics on postdoc openings that are not being filled due to a lack of graduating students? A: This is a good point. It is still a little early to see the full effect of the first wave of RunII graduands. Many CDF/D0 students will want to stay on as postdocs to see the 1-2 fb⁻¹ they may have anticipated seeing when they started their degrees. Q: What is your take on the LHC Physics Centre at Fermilab? A: This seems like a very good idea. But eventually it boils down to a question of resource allocation -- is it better to put additional resources into positions at the lab to support such an effort as opposed to putting those resources into the universities who are working on the LHC experiments?

UEC members commented that we shouldn't lose sight of the fact that University based researchers also work on smaller, more speculative experiments that sometimes come up with surprises and un-correlated benefits. Chivukula and Brock agreed that we also need to preserve the entrepreneurial spirit of University based researchers.

Report from the Users Meeting Planning Committee (Chris White)

Registration for the Annual Fermilab Users Meeting, June 2-3, is free and includes an invitation to dinner Wednesday. Optional box lunches may be ordered for Wednesday and Thursday at registration time. The form for registration can be found at:

http://www.fnal.gov/orgs/fermilab_users_org/users_mtg/2004/reg_2004.html

Posters for the meeting have been put up in Wilson Hall and distributed to the experimental areas. All speaker slots for the Users Meeting have been filled. Video and audio of the talks will be archived. Copies of the talks are being collected in advance of the meeting by Ken Bloom and will be downloaded on a PC for the presentations. The slides will also be attached to the agenda, which can be found at:

http://www.fnal.gov/orgs/fermilab_users_org/users_mtg/2004/users_2004.html.

Arrangements for the Users Meeting Dinner, to be held at the Users Center, Wednesday evening, June 2, have been completed. Chris is trying to arrange a public lecture for Thursday evening, June 3. Nominations for the Users Executive Committee will be accepted through noon June 8th. The nominations need the signature of 12 members of the Fermilab Users Organizations and the person being nominated. Forms can be found at the UEC Meeting web site given above or picked up at the Users Office.

New Perspectives Conference (Lydia Lobo)

The Fermilab Graduate Student Association is sponsoring the New Perspectives Conference June 3 and 4. A poster session and reception will be held on Thursday, with talks on Friday. Invited speakers include Leon Lederman and David Hertzog. The agenda can be found at:

<http://www.fnal.gov/orgs/gsa/calendar/np/2004/schedule.html>.

A barbecue will be held at the Barn Friday evening, June 4.

Next meeting sometime in the Fall of 2004 ...