

Minutes of the December 12th UEC Meeting

Present: Alton, Artuso, Bertram, Bloom (Video), Finley, Gottschalk, Hagopian, Hughes, Messier, Nguyen, Rolli, Tanaka, Trischuk (Everyone!)

GSA Representatives: Jennifer Pursley, Sinjini Sengupta

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

Report from Subcommittees:

DC Trip (Gottschalk):

Report on recent subcommittee meetings:

1. The "one-pager" summarizing the purpose of the visits will be reviewed by Finley and Tanaka.
2. Studied the "Dear Colleague" letter passed around the Senate last year.
3. Finalized date for joint SLUO/UEC meeting at Fermilab. The date is 15th of January. We expect about 15 visitors. Hagopian is inviting speakers, including April Burke and Mark Marin from the Lewis-Burke associates and Judy Jackson.
4. Relevant information regarding congressional districts, etc. are being collected from UEC members. The tentative date for the trip is 16-18th of March. Due to some problems with reserving hotel rooms last year, a block of rooms will be set aside and members will individually make reservations.

Users' Meeting (Bloom)

The general strategy has been to figure out the program, invite dignitaries and organize the schedule around their constraints. There have been warnings that due to congressional schedules, some members of Congress may find it very difficult to attend. Currently, Congress is scheduled to be in session during the planned dates of the meeting. Possible dignitaries from the Executive branch were also discussed.

Other potential speakers and themes include:

1. the International Linear Collider, particularly an international perspective.
2. The National Academy of Science Experimental Particle Physics Study
3. The APS neutrino study
4. The IUPAP C11 authorship study

A public lecture is also being proposed for the meeting, which has received a positive response from the laboratory. Some proposed themes include the "Quantum Universe" report and the Ansari X-prize.

In the next week, the subcommittee will check on the budget for the meeting and start delegating responsibilities to its members.

In a discussion on ways to increase attendance at the meeting, it was proposed that a model (that has worked in the Accelerator world) where results from one collaboration are presented by another was proposed. Other suggestions included more contact with experiment spokespeople.

#### Non-US Issues (Rolli)

The survey on non-US issues is ready to be circulated to the committee.

There have been no substantial comments, but a few technical issues to facilitate the data entry process are being finalized. Survey replies will be sent to two addresses on different servers to provide redundancy against possible failures.

Roy Rubinstein has provided some updates on visa information:

1. A researcher on a J1 visa can switch programs if he or she is hired by a foreign institution during the term of the visa (3 years).
2. There is legislation to extend the J visa to five years.
3. The H1 visa cap does not apply to educational institutions.

The subcommittee will finalize the survey and send it out with a January 7th deadline for replies. There will be a reminder sent out on January 5th. The subcommittee will produce a report on the results of the survey for the February UEC meeting.

#### Inreach (Alton):

The Inreach committee reported on a few issues:

1. Vegetarian Meals in the cafeteria. Jack Hawkins (in charge of the contract) has taken notice of the problem and has addressed the issue.
2. The lack of projectors in meeting rooms. As international collaboration and meetings with off site participants increases, projectors will become more important. It was pointed out that many institutions not only have projectors, but computers, in every conference room. The lack of projectors and the need to request them in advance is affecting meeting productivity.
3. Spokespeople of experiments have been notified of the Post-Doc mailing list to inform the post-docs on their experiments of its existence.
4. A survey on inreach issues has been finalized and will be put in place on the web and publicized after a test run.

#### Outreach (Messier):

The Outreach committee is trying to find a place within Fermilab's own outreach program. A few ideas are to assist in organizing an Open House at Fermilab and providing outreach resources for users to perform outreach activities at their home institutions.

#### Calendar of Events (Finley)

Finley presented a draft calendar outlining key dates for UEC activities and necessary preparations.

#### GSA Issues:

The GSA reported on two issues:

1. There is a need for more software classes. There are classes offered in the summer, but many students are not able to attend due to academic schedules, etc. This would be solved by offering another set of classes in the fall and winter. The GSA will try to quantify the demand for such classes and report to the Computing Division.

2. There is a need for taxi service off campus. Not all students have cars or live in the Chicago and would like to commute by train. Service to the airport was also suggested, but existing limo services should cover this need. A taxi service to nearby shopping centers and train stations will help solve this problem

#### Meeting with Fermilab Director Mike Witherell:

##### Current Status of the laboratory:

The accelerator complex is running again following the shutdown, which went well. A milestone was met when NuMI was able to send protons to the target area. The next step will be the observation of neutrinos in the near detector, which would mean that CD4 is accomplished. The target data for this is around January 20th.

The first Tevatron store occurred on December 7th, meeting a target date that was set back in August. Typical luminosity is  $5 \times 10^{31}$ , which matches performance at the middle of last year. With further tune-up, performance should improve. The startup has been much smoother than last year, when 2 superconducting elements went down in the first month after the shutdown.

MiniBooNE is running. Booster losses are two times higher than pre-shutdown

levels and there are instabilities at high protons-per-pulse. This means that tuning work is needed. This has not progressed to the point of seeing benefits from the dogleg modification performed during the shutdown.

Last week, a major event was the opening of the new Astrophysics center.

1) Can you update us on the ILC collaboration meeting held at KEK in mid-November?

I was able to attend most of the meeting, including the steering committee meeting. The meeting was heavily attended, with 230 participants (compared to the originally projection of 100). The collaboration is functioning well and working on technical issues. The meeting was a success, with broad participation, including 18 people from Fermilab

The next meeting will be in the summer at Snowmass and will span two weeks to focus on technical issues.

A search committee is looking for a director of the Central Design Team.

The CDT has evolved into a "lighter" structure, where most of the research and development will take place at the laboratories where the resources already exist. The head of the design team will travel between to coordinate activities, but there will not be significant additional effort associated with the CDT that is independent of those already existing.

The goal is to appoint the Director in early 2005 in time for the Snowmass meeting.

On the user side, there is a lot of activity associated with detector development as well as involvement in the accelerator R&D, via the SMTF, for example. There are 3-4 active detector study groups. Fermilab is also participating in this effort.

2) What is the status of the SMTF and discussions with other superconducting RF

partners around the country? There is a lot of planning happening, particularly with regard to organization. The EoI has been written, and space is being cleared to make way for the new facility. Progress has been somewhat difficult given the mid-budget start following the technology decision in August. By redirecting resources, we have directed \$6 million to SMTF by consolidating superconducting RF and NLC work. We are currently not under any technical limitations; things could progress

faster if we had more money.

3) Where there any decisions that were made as a result of advice you got from

the PAC meeting in November?

The November PAC meeting was primarily informational, but one key decision

was the recommendation to extend MiniBooNE running in FY2006. This was approved. Further running will require a proposal, for which the results of the first phase will be a important input. MiniBooNE projects obtaining its first results on  $\nu_\mu \rightarrow \nu_e$  oscillations in fall of 2005.

4) Has there been any clarification of what the budget that was passed in the

Omnibus bill will mean to the lab?

The FY2004 budget for Fermilab was \$287.3 million dollars. The FY2005 budget is \$290.9 million, which is an increase of 1.2%, enough to keep up with inflation. The High Energy Physics budget is up 0.3% to \$736 million.

Concerning the turnover in the Directorship, Oddone will be making regular trips to Fermilab and will be present at Fermilab half time in April and May. In June, he will be at Fermilab full time.

Judy Jackson: Director of Public Outreach

The Public Affairs office reaches out to very different audiences:

1. Fermilab community
2. Neighbors
3. The HEP community
4. Political establishment
5. Media

One of the main achievements this year is the publication of "The Quantum Universe." It has been a big success with 3 printings of 5000 copies already

distributed. Demand continues, so printings will continue.

"The Quantum Universe" was produced with policy makers as the target audience;

they were consulted throughout the process. Their input was considerable, and

the final result was quite different from what was originally conceived.

In

particular, they emphasized that the science was the most important message

and that the connections between the cosmos (dark matter, dark energy) and

particle physics is particularly compelling.

The Public Affairs offices of SLAC and Fermilab work closely together, with 1.5 hour joint meetings every week and contact every day. One of the products of this collaboration is "Symmetry" magazine. The Chief Editor of the magazine, David Harris, spends half time at Fermilab. He is eager for feedback from the user communities at Fermilab and SLAC.

In order to improve relations with the local community, the Fermilab Community Task Force was created. The Task Force is a group of about 20 local residents who have been chosen to represent the local interests. The charge to the Task Force is to produce a set of recommendations on how Fermilab should interface with the local community when issues arise. The process has been facilitated by public policy consultants and is seen as critical for future projects such as the International Linear Collider. Fermilab directors have always been strong advocates of community outreach; the tradition will continue with Oddone.

The NuMI dedication will occur at the end of February. Many local people have been invited. The NuMI project has run a very active outreach program by providing tours to members of the local community and providing information on the implications of the neutrino beam it will produce. Recently, members of the NuMI project provided 25 back-to-back tours for residents who were affected by the blasting during the excavation phase.

Steve Geer: Physics of the Proton Driver

One of the key recommendations of the Fermilab Long Range Planning Committee (FLRPC) was the preparation of documents for a CD0 for a Proton Driver situated at Fermilab and to develop a physics case for the facility centered around a fore-front neutrino program. A number of study groups were put together, composed equally of Fermilab personnel and outside researchers, to investigate the physics possibilities (both neutrino and other physics). The working groups reported at the Proton Driver Physics Workshop in October,

and an advisory committee headed by Peter Meyers (Princeton University) has been convened to review the reports. The review will provide critical feedback for the CD0 process. A second review is scheduled for the end of January.

As mentioned, the primary motivation for the proton driver is to provide neutrino beams for a world class neutrino oscillation program. The observation of neutrino oscillations indicates that neutrinos have a small but non-zero mass. With neutrinos outnumbering other particles in the universe by a factor of about 10 billion, neutrinos may account for a significant portion of the dark matter in the universe. Neutrinos are also critical in understanding the dynamics of supernovas from which the heavy elements in the universe were produced, and may provide clues on baryogenesis. In short, a deep understanding of the universe requires detailed understanding of neutrinos.

#### Neutrino Oscillations:

Our current understanding of neutrino oscillations already has mysteries. First, the Standard Model must be modified to accommodate non-zero neutrino masses. The mass hierarchy suggested by the oscillation evidence is radically different from the quark sector, suggesting they may originate in new physics. The mixing matrix for the oscillation has very large off-diagonal elements. This is completely different from the quark sector, leading to rethinking of symmetries between the lepton and quark sectors. Data from neutrino oscillation experiments are already driving grand-unified theories and ruling them out.

Long baseline neutrino oscillation experiments based on a proton driver can play a key role, providing the first sensitivity to CP violation in the lepton sector and constraints on neutrino oscillation parameters. This program goes beyond current facilities, in particular by allowing much longer baselines, where sensitivity to matter effects may provide information on the mass hierarchy of the neutrino sector.

There has been debate on whether to pursue a narrowband beam from an off-axis configuration or a broadband beam where multiple oscillation maxima can be

observed. A new idea where a broad energy range is spanned with multiple narrow-band beams may bridge the differences and advantages of both approaches.

#### Neutrino Scattering:

A new generation of neutrino scattering experiments are needed to reduce systematic uncertainties on neutrino cross sections that will impact neutrino oscillation studies. These experiments are interesting in their own right; they probe the structure of the nucleon in a way complementary to electron scattering.

New experiments (Minerva, FINESSE) using existing neutrino beams will allow high statistics analysis of neutrino scattering on nuclear targets. The intense neutrino beam produced by the proton driver will allow similar studies of neutrino scattering on hydrogen and deuterium targets, where theoretical and systematic uncertainties are smaller, as well as studies with anti-neutrino beams.

Experiments using the neutrino beam produced directly from the 8 GeV protons from the proton driver may be the most important. Neutrinos from such a beam are in the energy range between the resonant and deep-inelastic region.

#### Muon Physics:

Muon physics, in the form of  $g-2$  measurements, searches for electric dipole moments and lepton flavor violating processes ( $\mu \rightarrow e \gamma$ ,  $\mu \rightarrow e$  conversion, etc.), provide probes for new physics that are complimentary to the energy frontier program (LHC, ILC).

The muon physics program needs both intensity and the right bunch structure, which is different for each experiment. There are studies in progress to investigate using the recycler to rebunch the beam into the right configuration.

A study shows that nearly  $3 \times 10^{21}$  muons will be produced every year using a solenoidal decay region. This nominally exceeds the statistics needs for a competitive muon physics program by orders of magnitude. However, these muons will occupy a large transverse phase space not suitable for experiments; this will need to be solved.

Other physics discussed at the workshop (but not discussed due to time constraints):

1. Pion physics,  $V_{ud}$  measurement.
2. Kaon physics
3. Neutron physics, Neutron electric dipole measurement
4. Pbar physics, hyperon physics.

Next UEC meeting: January 15th, 2005