Group 5: Non-oscillation measurements

Goals: Write the sections of the report describing sensitivity for the measurement of the non-oscillation physics (electroweak, structure functions, heavy quarks and couplings, exotic searches) versus beam energy, intensity, baseline length, muon polarization, detector details, etc.

Contact person:
Eric Hawker (hawker@fnal.gov)

People in group:

Fritz DeJongh	Debbie Harris
Eric Hawker	Kevin McFarland
Jorge Morfin	Stephen Parke
Heidi Schellman	Robert Shrock
Ray Stefanski	
Mayda Velasco	
Gokhan Unel	
Jae yu	

Minutes of the organization meeting for non-oscillations group 2PM on Thursday, October 7th, 1999

Attendance:
Heidi Schellman
Fritz DeJongh
Eric Hawker
Jae Yu (after 3)
Debbie Harris (after 3)

Many people could not attend due to the time chosen. We also found that several people who had expressed interest in the group were not on the mailing list. We're trying to rectify this.

We first discussed whether exotics and normal DIS should split into two groups. The discussions were so interesting we probably won't split for now.

General Work plan

The non-oscillation sub group of the neutrino factory study will be focusing on the following topics.

- Electroweak measurements:
  - sin2thetaW measured in nu-e scattering (Schellman?)
  - sin2thetaW measured in DIS scattering (Yu?)

- Structure function measurements:
  - High statistics measurements of F2 and F3 off of hydrogen and deuterium targets.
  - A-dependence of neutrino cross sections (Schellman?) Jorge Morfin has expressed interest in general QCD measurements

- Heavy flavor physics and CKM matrix studies:

This is a big and interesting topic but we don't have anyone identified yet.

- <u>Spin Structure Functions:</u>
  (Velasco, Unel and Eichblatt have expressed interest)

- <u>Exotic particle/interaction searches:</u>

Fritz deJongh gave a nice discussion of these

- R-parity violating SUSY search (looking for wrong sign muons). (deJongh and Stefanski?)
- neutrino interactions with "large size" extra dimentions?? (a WIMP search?) (deJongh is already doing this)
- Neutral Heavy Lepton searches
- other topics?

While many of these topics could use the muon storage ring and its neutrino beams, there is a possibility that the pi and K mesons in the muon production and capture channel could be another source of neutrinos for these studies.

In addition to the above topics there are several topics which may, or may not, be included in the final report of the study group. However, we still wish to strongly encourage people to work on these topics, and we still would like to recruit people to work on these topics and others, even if they are not included in the final report. We see the studies of all of these topics possibly being published separately from the final report.

In order to study these topics more efficiently a certain amount of "infrastructure" work should be done and quickly.

Overview of cross sections and formulas (Schellman and Geer) neutrino cross section codes, (Harris) neutrino beam parameter codes (Geer)

Most of the cross section and beam parameter information can be put into ntuples, which then can be easily distributed and used by the group.(Schellman and Harris are working on this)

We also need to avoid reinventing the wheel. A thorough study of the existing literature, in particular CERN writups and the Lyon talks. In addition, Bruce King is preparing a long Physics Report type document summarizing much of the physics listed here -several members of our study group are co-authors on this and it is expected to be available by the end of the year. We should use these resources where available.

The next meeting of the full neutrino factory study group will be on 10/12 at 11:30 CDT in WH12NW. If that meeting is short, we may be able to use the time afterwards as we have the room until 2. The official next meeting for the non-oscillation subgroup will be on 10/19 at 11:30 CDT. We will use the WH12NW slot if we can get it.