Oscillation Measurements/Detectors Working Group Update
November 9

cast of characters: Bernstein, Spentzouris, Geer, Raja, Stefanski, Velasco, McFarland, Shanahan, Raja, Prebys, Mills, Campanelli, Harris

2 Goals have emerged in this group:

1. Understand what the data might actually look like
   - fiducial effects
   - backgrounds (charm, charge mis-id)
   - feed-through from different channels
     - $\nu_\mu \to \nu_\tau$
     - $\nu_e \to \nu_\tau$ on top of $\nu_e \to \nu_\mu$
   - different smearing scenarios

First Pass–wrong and right sign muon energy distributions (PGS, with help from DAH,KSM)

Detector: 4cm steel, 2.cm readout thickness, 1.5T field in steel:
Muon momentum resolution: 5% for muons that range out, 10% for muons that go all the way through the detector $3 \times 3m^2$, 10kTon-year

Backgrounds included:

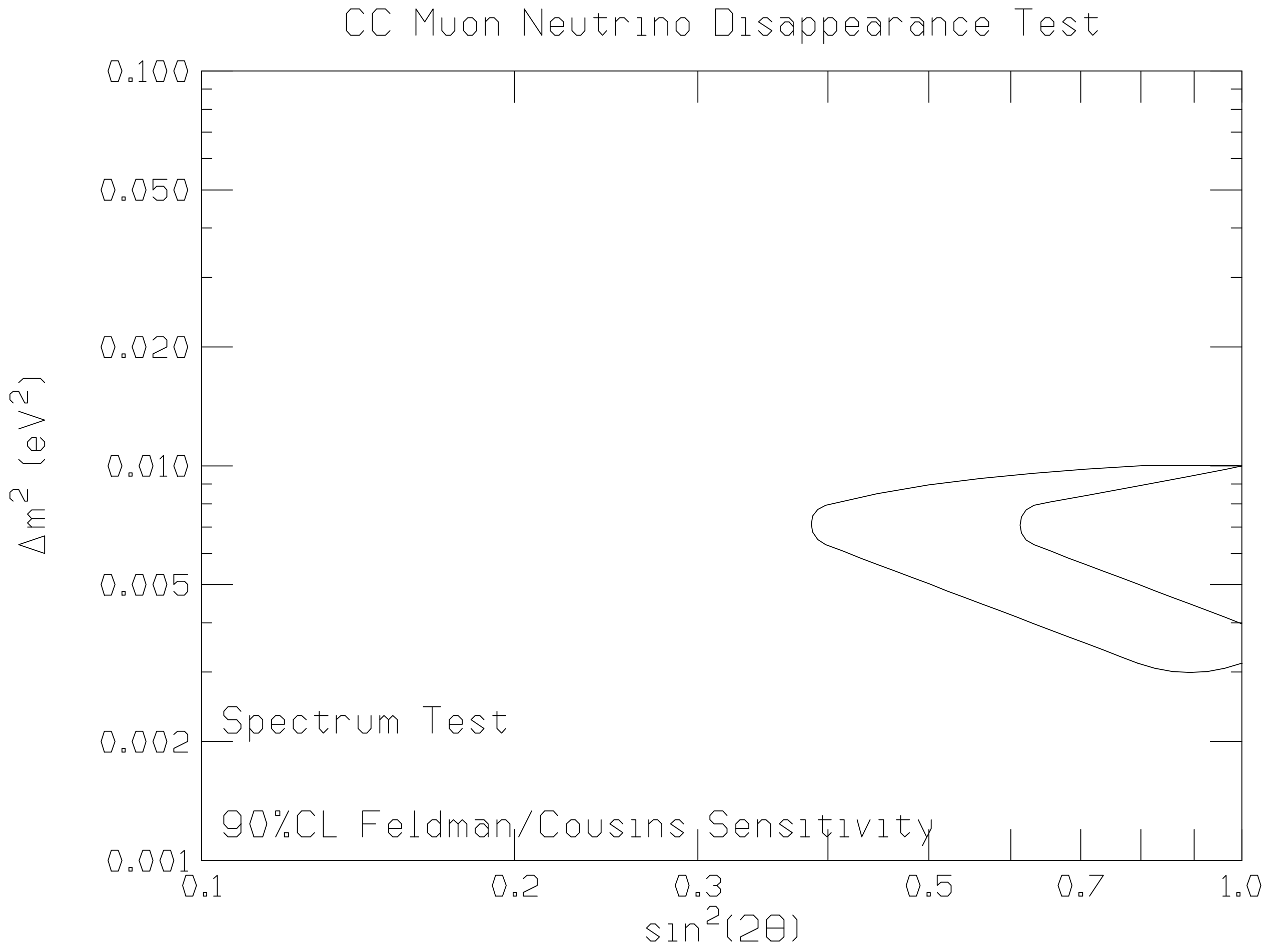
- From Charm$\rightarrow \mu$ decays (both NC and CC)
- π and K decays in hadronic shower (NC and CC)

For 2-muon events, if "leading muon" is less than 5GeV consider it lost, or if leading muon leaves detector before 2m of steel

τ feed-through included! $\nu_\mu \rightarrow \nu_\tau$ as well as $\nu_e \rightarrow \nu_\tau$

2. Go from Measured Data distributions to constraints on mixing angles (RHB)
   - Use Feldman-Cousins perscription for determining sensitivity –lots of gedanken experiments
   - What is really measured is combinations of angles:
     - $P(\mu \to \mu) = 1 - 4C_{13}^2 S_{23}^2 (1 - C_{13}^2 S_{23}^2) S_{\Delta\mathrm{atm}}^2$
     - $P(\mu \to e) = 4S_{13}^2 C_{13}^2 S_{23}^2 S_{\Delta\mathrm{atm}}^2$
     - $P(\mu \to \tau) = 4C_{13}^4 S_{23}^2 C_{13}^2 S_{\Delta\mathrm{atm}}^2$

Sample Sensitivity Plot! (RHB) Fit Reconstructed CC Neutrino Energy distributions



- 0.1 kton-Year Detector with MINOS resolution

- 2800km baseline
- No backgrounds or fiducial cuts
- Statistical errors only
- No matter effects (not a big deal here)

Welcome New Blood to the group!

- Mario Campanelli to join us with ICARUS detector Monte Carlo
  and matter effect calculations
- Geoff Mills
- Eric Prebys–Cerenkov
- No one is signed up for emulsion!!