SANE experiment update

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Slides from talks by Whit Armstrong and Oscar Rondon
Polarized Electron Beam: 4.7, 5.9 GeV

Polarized Proton Target: $\perp$, $\parallel$

Ammonia ($\text{NH}_3$) Polarized via DNP in 5T Magnetic Field
BETA with DIS electron simulation

[1] BigCal Collaboration
[5] UVA- JLab
Proton world $A_{\parallel}, A_{\perp}$ data before SANE

- Two beam energies: 5.9 GeV, 4.7 GeV
- Very good high $x$ coverage with detector at 40°
BETA and HMS data

- $Q^2 - x$ phase space of BETA's 80° data
  
  - cut on $E' \geq 1.3 \text{ GeV}$

- Central kinematics of HMS inclusive asymmetry data
Pair-symmetric background - I

- BigCal detects both charge signs
  - Significant background from $e^+e^-$ from $\pi^0$ decays
  - Partial control with cut on $E' \geq 1.3$ GeV; worst dilution $< \sim 0.2$
  - Estimate with GEANT simulation of $\pi^0$ production
  - Need inclusive pion photo- and electro-production cross sections
  - Existing D. Wiser parametrization only for H, D targets
  - Parameterized Yerevan pion photoproduction data on C at 4.5 GeV
    - Cross section scales with pion $P_T$ : use simple exponential scaling fit
    - Included fit in J. O'Connell EPC code for single arm hadron photo and electroproduction
    - Compared with DESY electroproduction on C at 5 GeV
Pair-symmetric background - II

- Fitted $\pi^+$, $\pi^-$ data at $20^\circ$, $40^\circ$, $60^\circ$ to $\sigma(P_T) = a e^{-bP_T}$

- $\pi^0$ fit from average of $\pi^+$ and $\pi^-$

- Wiser $\pi^-$ data on H scaled times 12, along with data on C and scaling fit (only to C)
Pair-symmetric background - III

- Test of scaling fit with DESY C(e,\pi^-) data at 5 GeV, 13°

$x^2 g_1^p$
Models are showing $g_2^{WW}$. 

$x^2 g_2^p$
Projected error bar on $d_2$
Future work

• Finalize pi0 background estimate
• Finish recalibration of BigCal energy calibration using both pi0 and eta decays.
• Expect to be finished by end of 2014.