Systematics, Deadtime, and Asymmetries

- Personnel
  - Damon Spayde (co-leader)
  - Betsy Beise (co-leader)
  - Louis Bimbot
  - Jim Birchall
  - Mark Pitt (beam)
  - Brian Quinn
  - Steve Williamson
  - Jeff Martin (bkgnd)
- Working group meeting Friday at 9:00 AM?

Scope

1. Coil Pulsing
2. Deadtime Systematics
3. Asymmetry Systematics

   3b) Transverse pol'n running
4. Lumi Checkout
5. Target Density Tests
6. Background Data
7. 120 Hz running

Coil Modulation

Are yield slopes that we measure with "natural beam motion" the same as those measured with coil modulation? If not, why not?

- need pass 2 analysis of coil data, compare to yield slopes in database.
- Will get data at start of every run. Are dedicated runs required?
- energy modulation? Dedicated time needed?

Deadtime Systematics

- Characterize effectiveness of deadtime corrections.
- Prerequisites:
  - Working charge and position feedback.
  - Background studies complete.
  - Ability to set large dI/I without inducing large dP/P.

- What dedicated electronics checkout required? (DNL?)
- Reanalyze/study BCM calibrations (how often to do?)

- Ideas:
  - Y vs. I for C, Al, and liquid H_2
  - Wells charge plots (dY/Y vs. dI/I): multiple beam currents and dI/I settings

- How to define systematic uncertainty on asymmetry due to DT? (How to decouple from L.R....)

Asymmetry Systematics

- Purpose: Characterize false asymmetries.

- Prerequisites:
  - Working charge and position feedback
  - Ability to set large dP without inducing large dI/I

- Ideas:
  - Wells position plots (dY/Y vs. dP): multiple beam currents and dP settings (x & y)
  - Detector asymmetry data w/ and wo/feedback
  - Test/measure 3 flavors of YO! with VME TDC.

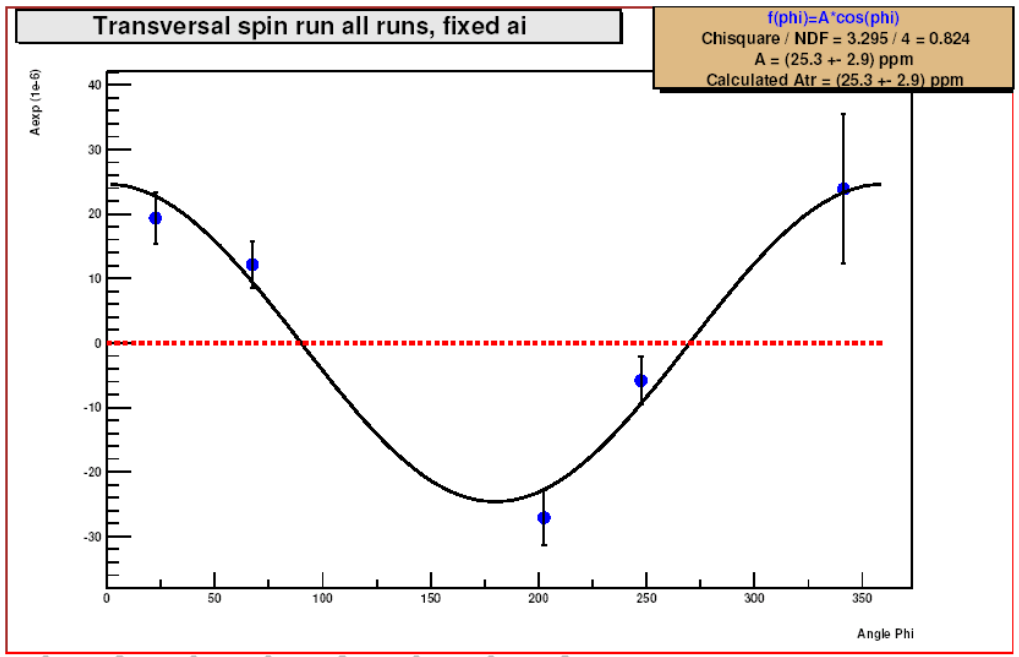
  - Transverse asymmetries:
    - Look for sensitivity to potential transverse pol'n components
    - No way to measure transverse polarization in Hall C --- measure in Hall A?
    - Impact on Hall B?
    - can do $\Delta A \sim 1$ ppm per ring in 2 days (x4)

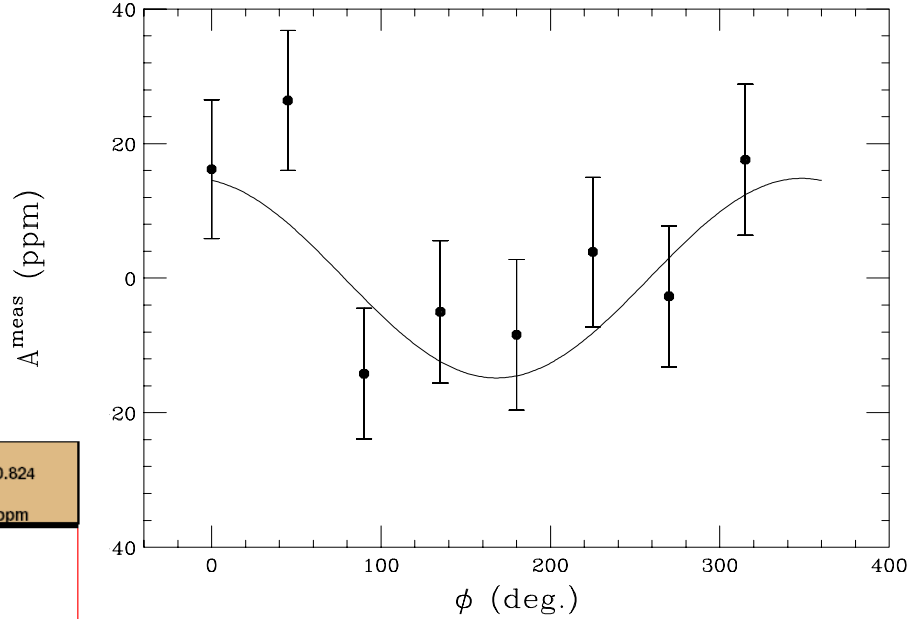
Beam Spin Asymmetry in p(e,e')

- transverse beam pol'n: Beam spin asymmetry (parity conserving)

$$\varepsilon(\theta) = \frac{\sigma_{\uparrow}(\theta) - \sigma_{\downarrow}(\theta)}{\sigma_{\uparrow}(\theta) + \sigma_{\downarrow}(\theta)} = A(\theta)\langle P \rangle$$

  - lowest order is 2-γ





SAMPLE (Q^2=0.1)	-15.5 ± 5.4 ppm (130°<θ < 170°)
PVA4 (Q^2=0.23)	-25.3 ± 2.9 ppm (30° < θ <40°)

Lumi Checkout

- Purpose: Commission new luminosity monitors.
- Prerequisites: None (other than monitors)
- Ideas (Jianglai's plan):
  - Signal checkout
  - Signal linearity/HV optimization on ^{12}C
  - Signal/noise measurement (need 5^{th} PMT)
  - Signal linearity/HV optimization on LH_2
  - Background measurements (different Pb configurations)
  - Asymmetry width vs. I on LH_2, multiple currents and gains

Target Density Tests

- Purpose: Verify residual deadtime is not a target density effect.
- Prerequisites:
  - Deadtime studies
  - Lumi checkout
  - BCM calibration
- Ideas:
  - Yield/asymmetry vs. I on LH_2, multiple fan speeds and raster sizes
  - Yield/asymmetry vs. I on fly-swatter and ^{12}C
  - maybe we already have the data?
  - should we repeat boiling tests w/ new target cell?

Background Data

- Purpose: Determination of asymmetries from background sources.
- Prerequisites: Initial background studies
- Ideas:
  - Fly-swatter asymmetry with empty target
  - Empty target asymmetries
  - Asymmetry data at different magnet currents

  - OTHER
  - short TE runs w/2 different YOs.
  - cross/check det 14 with NA/FR electronics

Beam Polarization