GDH Analysis: Acceptance

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Pol. ^{3}He Collaboration Meeting

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- Optics Technote

- Analysis Software: Analyzer

- Acceptance

- Summary

Optics Technote

- Third version of the technote was released in August.
- So far no comments, except for Ron!
- Available on the web from my homepage at papers/sagdh_tech_note-v3.pdf or ps.
- Almost final version.
- Depending on Tim's findings, I may modify 6° shift corrections section.

Analysis Software: Analyzer

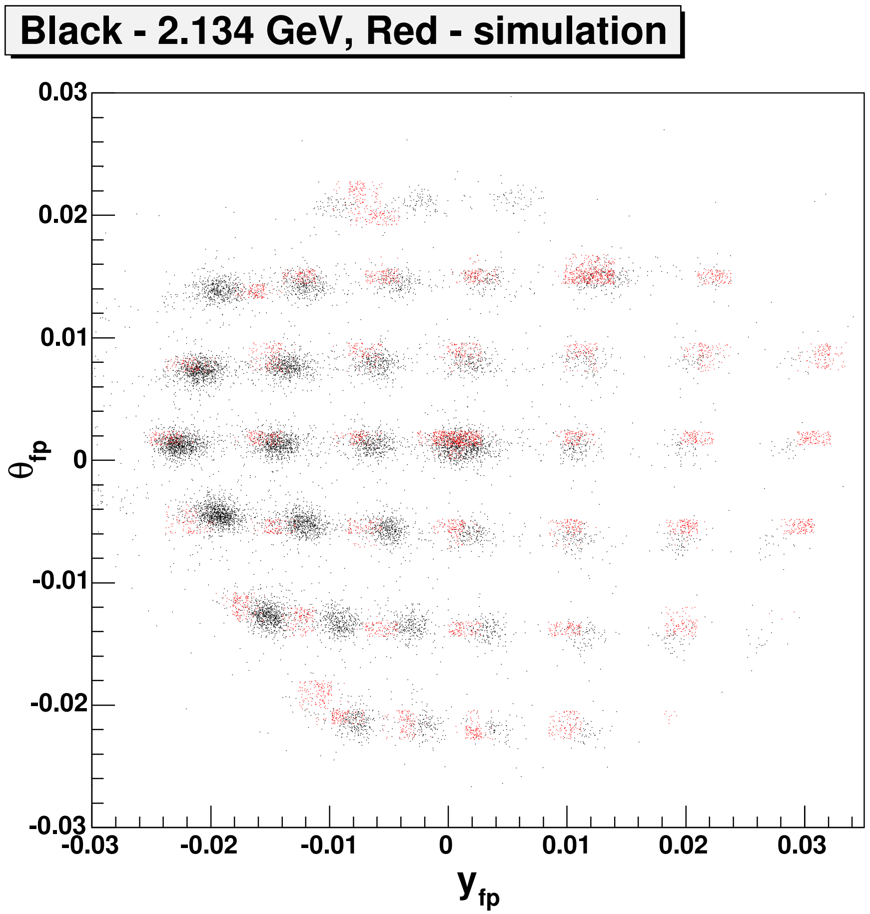
- Compiled an official version of the Analyzer for GDH Analysis
- Differences between standard and GDH Analyzers: (Second run period only)
  - Includes optics matrix elements for GDH.
  - Includes Hai-jiang's PID constants for preshower, shower and Cherenkov.
  - Includes shift corrections for 6 and 9 degrees.
- Remaining issues:
  - Finalize a few database parameters.
  - Fix error messages from scalers.
  - Check helicity

Helicity from the Analyzer

- Used G0 mode for both periods:
  - First period delayed by 8 cycles.
  - Second period was in time.
- Problem: flags are hard-coded into the Analyzer.
  - Should be easy to create set functions for these flags.
  - Then only one Analyzer will be needed for both periods.
- Careful check of helicity needs to be done.
  - Implement changes Seonho made in ESPACE.
  - Check prediction algorithm for delay mode.
  - No delay uses a hack Bob make for DVCS and should also be checked.

Acceptance for saGDH

- Uses Xiaodong's code:
  - John LeRose's septum 6 degree transfer functions.
  - Apertures for 10 places throughout septum/HRS
  - Included collimator at sieve slit location.
- Obtained Reasonable comparison between MC and sieve slit data.



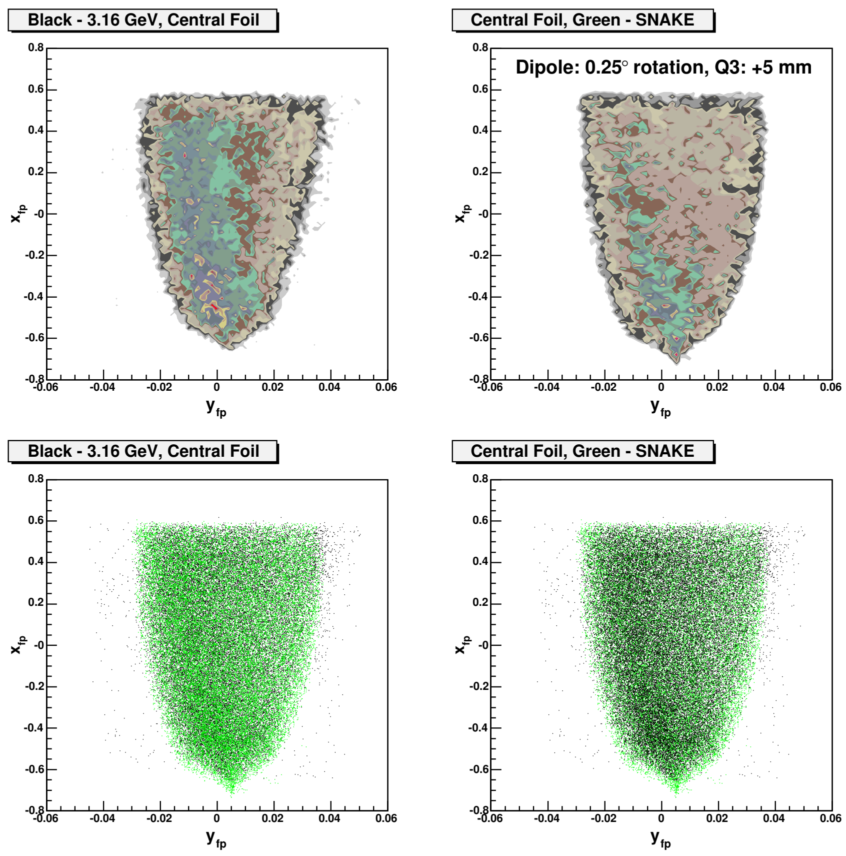
Black - 2.134 GeV, Red - simulation
0.03
0.02
0.01
0
-0.01
-0.02
-0.03
θ_{fp}
-0.03
-0.02
-0.01
0
0.01
0.02
0.03
y_{fp}

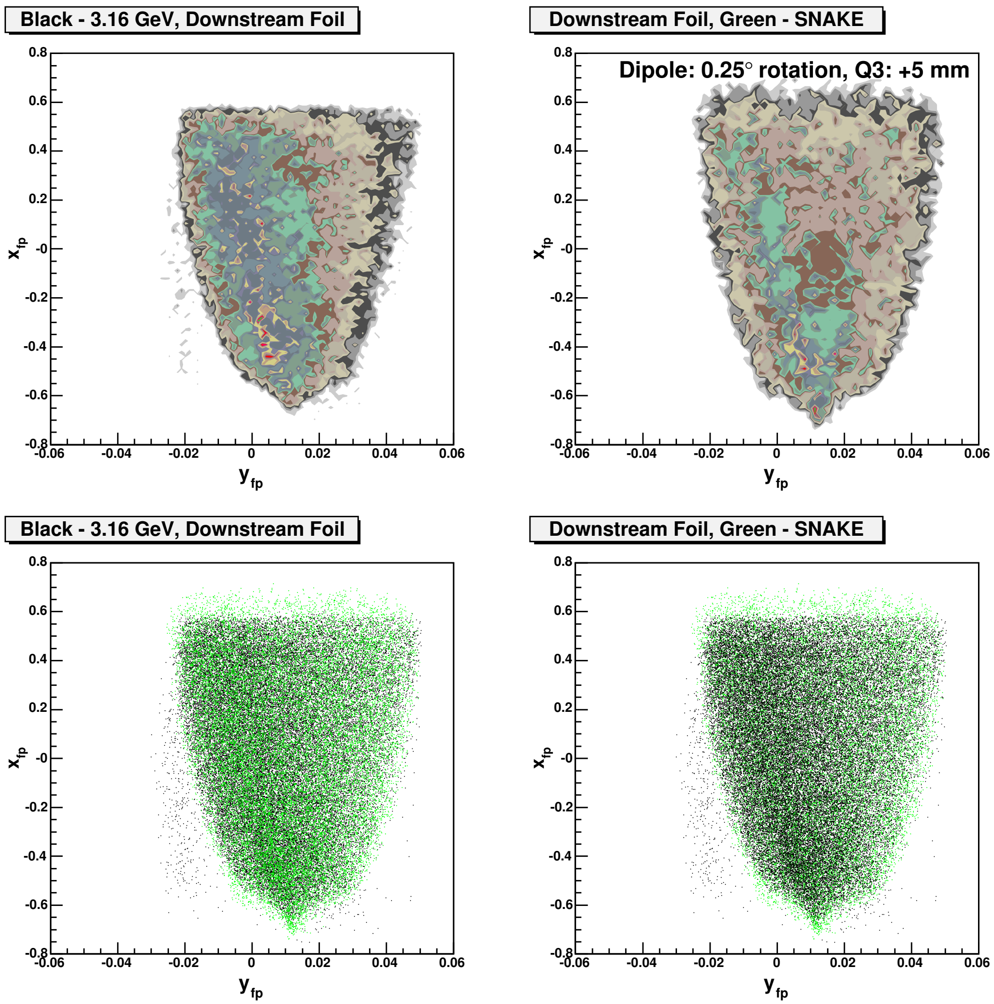
Modifications to the Model

- Discovered sign error in Dipole exit aperature between SNAKE and simulation (small correction).
- Started using SNAKE.
  - Use simulation as an event generator for SNAKE.
  - 15 msr solid angle acceptance, individual foil, δ: $\pm$ 7%.
  - Faster to make changes to the model and see effects.
- Obtained reasonable agreement between Data and SNAKE ($x_{\rm fp}$ vs. $y_{\rm fp}$):
  - For all three foils at P_0 = 3.16, 2.05, and 0.95 GeV.
  - Used different combinations of adjusting septum field strength, and orientations of the dipole and Q3.
  - Added Bore Cooler to simulation.

- Bore Cooler Dimensions (M. Stevens).
  - 1/4” copper tubing, 1/8” copper plate, 0.07” pad
  - Length: 43.2 cm
  - Width: 11 mm, (Model looks better with 8 mm)
  - Templates still exists, but cooler was trashed.

Black: data, Green: simulation.

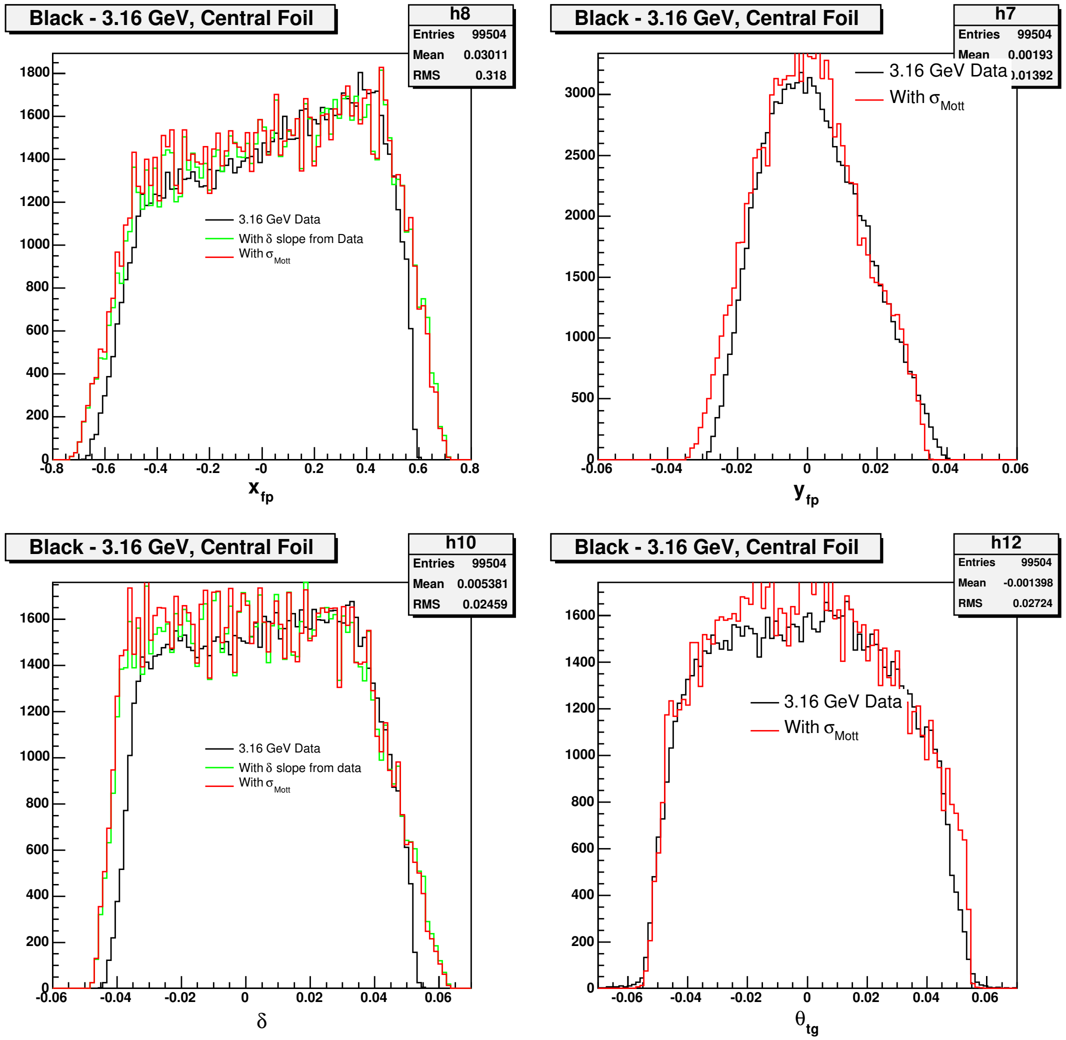




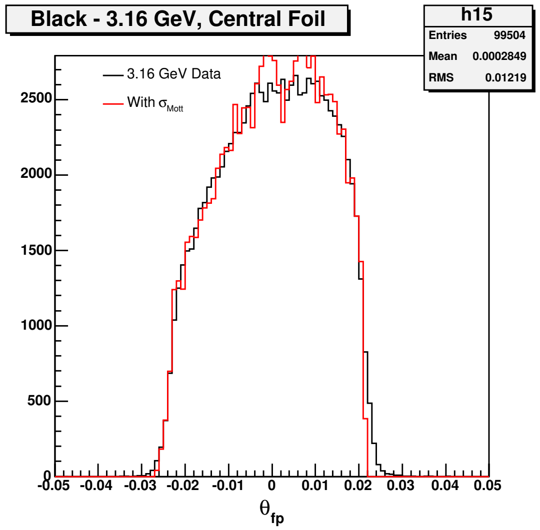
Black - 3.16 GeV, Downstream Foil
Downstream Foil, Green - SNAKE
Dipole: 0.25° rotation, Q3: +5 mm
Black - 3.16 GeV, Downstream Foil
Downstream Foil, Green - SNAKE
x_fp
y_fp
0.8
0.6
0.4
0.2
-0
-0.2
-0.4
-0.6
-0.8
-0.06
-0.04
-0.02
0
0.02
0.04
0.06

Adding Physics

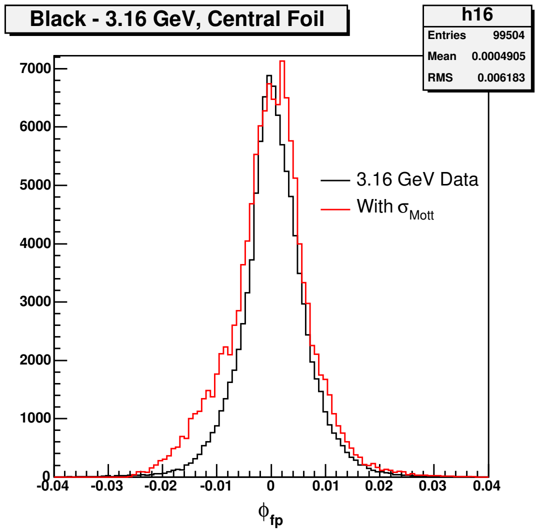
- Weighted variables from SNAKE by σ_{Mott}.
- Changed back to nominal model with bore cooler.
- Improved the target collimator cut:
  - Fit the collimator edge from data to either exponential or Gaussian.
  - Weighted simulation with fit and obtained reasonable agreement with data (both foils).
- Determined δ slope from the data and checked results with σ_{Mott}.
- Simulation with weighted σ_{Mott} or δ slope are comparable and agree with data.



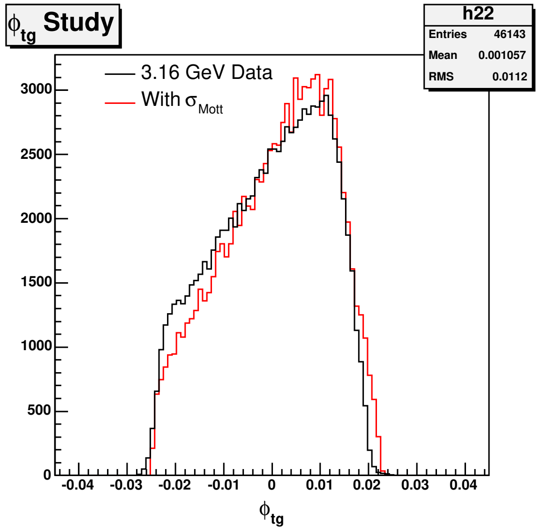
- Black: Data, Red: simulation weighted by σ_{Mott}, and Green: simulation weighted by δ slope from data.



Black - 3.16 GeV, Central Foil
h15
Entries 99504
Mean 0.0002849
RMS 0.01219
3.16 GeV Data
With σ_Mott
θ_fp



Black - 3.16 GeV, Central Foil
h16
Entries 99504
Mean 0.0004905
RMS 0.006183
3.16 GeV Data
With σ_Mott
φ_fp



φ_tg Study
h22
Entries 46143
Mean 0.001057
RMS 0.0112
3.16 GeV Data
With σ_Mott
φ_tg

Remaining Issues and Tasks

- Excess δ acceptance.
- Easily removed by adjusting Q3 aperature.
- Study collimator cut at other momenta.
- Study acceptance ratio (Data/Sim.) cut dependency.
- Check data with simulation at 9°.
- Generate new transfer functions for 6° and 9°.

Summary

- Third version of Optics technote available.
- Version of Analyzer setup for GDH. Need to make sure helicity is correct.
- Acceptance
  - Comparisons with ^{12}C foil data look good.
  - Fine tune model for dispersive acceptance.
  - Acceptance study at 9°.

Still To Do

- Finish acceptance study.
- Raster calibration
- Writing technote for Duality target analysis.
- Write up gradient studies for saGDH.