

Bend-Down Optics

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Outline

1 Bend-Down Optics

2 To Do

Bend-Down Electron Optics Shift

$E = 1.232 \text{ GeV}$ on H^2 Target

Discovered a **0.9%** shift in $\delta p/p$

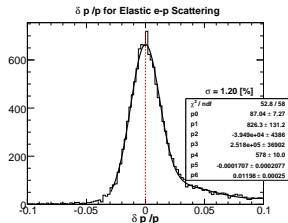


Figure: Original bend-down electron $\delta p/p$ spectrum from early 2010.

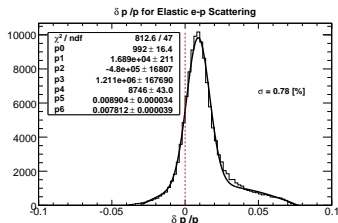


Figure: Current bend-down electron $\delta p/p$ spectrum.

Optics Investigation

- Started with Xin's bend-down calibrations
- Replaced each of Xin's calibrations with Diana's updated calibrations
- I only seen a **considerable shift** in $\delta p/p$ when removing Xin's **energy loss** correction
- Also noticed that in the **bend-up** optics a scale factor was applied to the momentum (handles shift from energy loss), this was missing from **bend-down** optics.
- Determined the scale factor by **minimizing** $\delta p/p$

Bend-Up scale factor: 1.0141

Bend-Down scale factor: 1.0140

Bend-Down Electron Optics (Corrected)

$E = 1.232 \text{ GeV}$ on H_2^2 Target

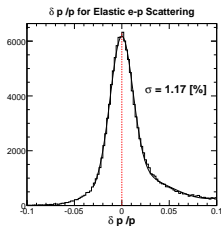


Figure: $\delta p/p$ for bend-down electrons after updating Diana's optics calibrations with a scale factor.

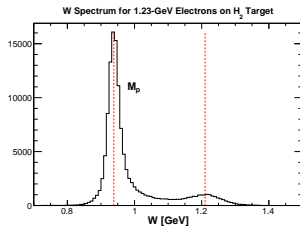


Figure: W spectrum for bend-down electrons after updating Diana's optics calibrations with a scale factor.

Bend-Up Electron Optics (For Completeness)

$E = 1.232 \text{ GeV}$ on H^2 Target

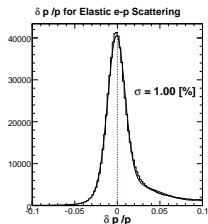


Figure: Current $\delta p/p$ for bend-up electrons.

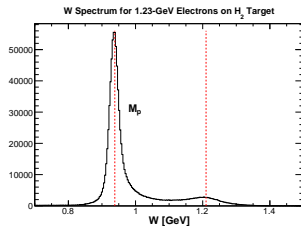


Figure: Current w spectrum for bend-up electrons.

Affect of Momentum Shift

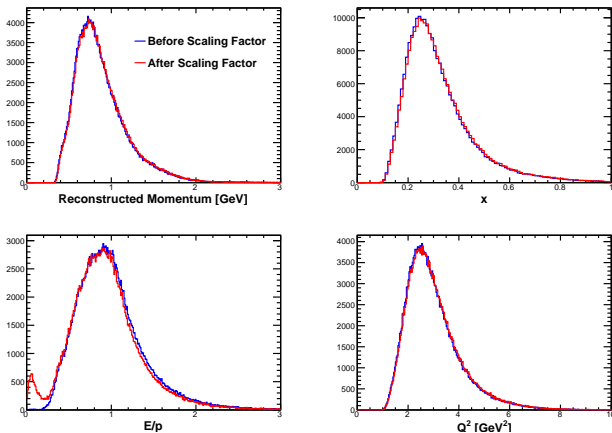


Figure: Shows the reconstructed momentum, x , Q^2 and E/p distributions for bend-down events before and after the optics correction.

Summary

Bend-Down Optics

- Fixed bend-down momentum shift by applying a **scale factor** similar to the bend-up optics
- Change in event distributions due to the **shift** is **small**.
- Shift was $\approx 0.9\%$ and momentum resolution is $\approx 1\%$
- Could implement the scale factor during the skim procedure (This would require a skim replay of all production data)

To Do

- Work on GEANT Simulation
- π/e ratios for positive polarity
- Use world data to form d_2 at low and high x regions