

Impact Studies – Update

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- DVCS + BH + INT
- GK16 model
- Kinematic cuts:

$$0.0001 < xB < 0.630957$$

$$1 \text{ GeV}^2 < Q^2 < 1000 \text{ GeV}^2$$

$$0.2 \text{ GeV}^2 < |t| < 1.3 \text{ GeV}^2$$

$$0.03 < \phi < 6.2531$$

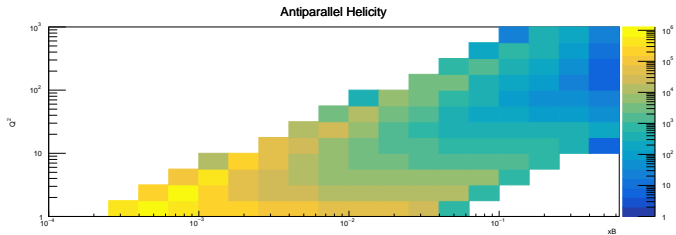
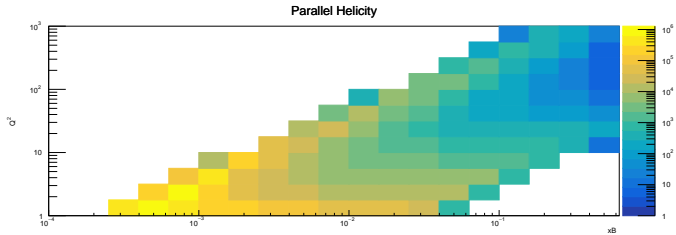
$$0.01 < y < 0.95$$

- Electron energy = 10 GeV, Proton energy = 100 GeV
- No radiative corrections
- Unpolarized target, 11.2 M Events (5.6 M parallel, 5.6 M antiparallel)
- Luminosity = $\approx 9.66 \text{ fb}^{-1}$, $A_{LU} = \frac{d\sigma^{\rightarrow} - d\sigma^{\leftarrow}}{d\sigma^{\rightarrow} + d\sigma^{\leftarrow}}$

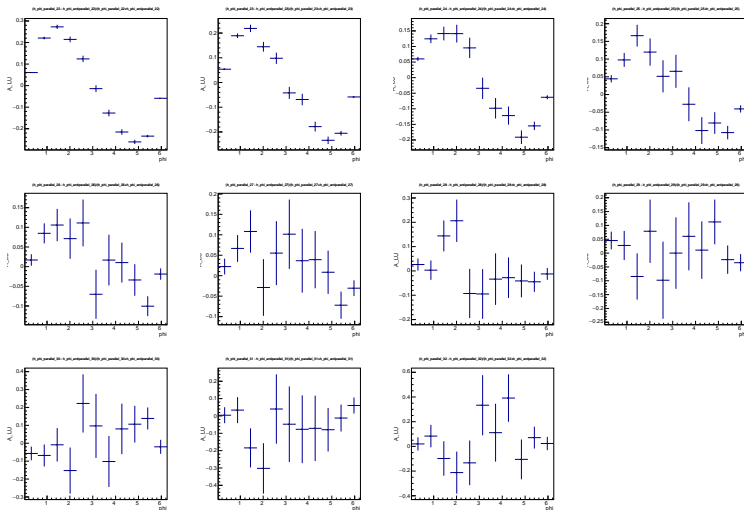
$$Q^2 = [1.0, 1.77828, 3.16228, 5.62341, 10, 17.7828, 31.6228, 56.2341, 100, 177.828, 316.228, 562.341, 1000.0]$$

$$x_{Bj} = [0.0001, 0.000158489, 0.000251189, 0.000398107, 0.000630957, 0.001, 0.00158489, 0.00251189, 0.00398107, 0.00630957, 0.01, 0.0158489, 0.0251189, 0.0398107, 0.0630957, 0.1, 0.158489, 0.251189, 0.398107, 0.630957]$$

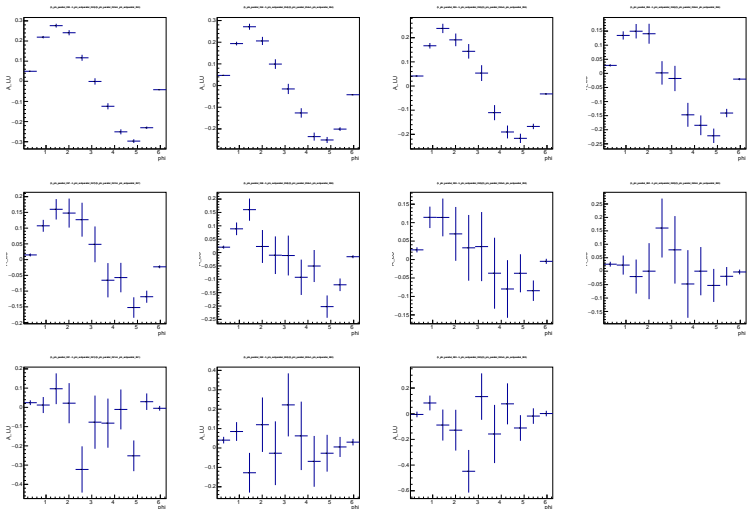
$$|t| = [0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0, 1.1, 1.2, 1.3]$$

$x_B - Q^2$ Correlation:

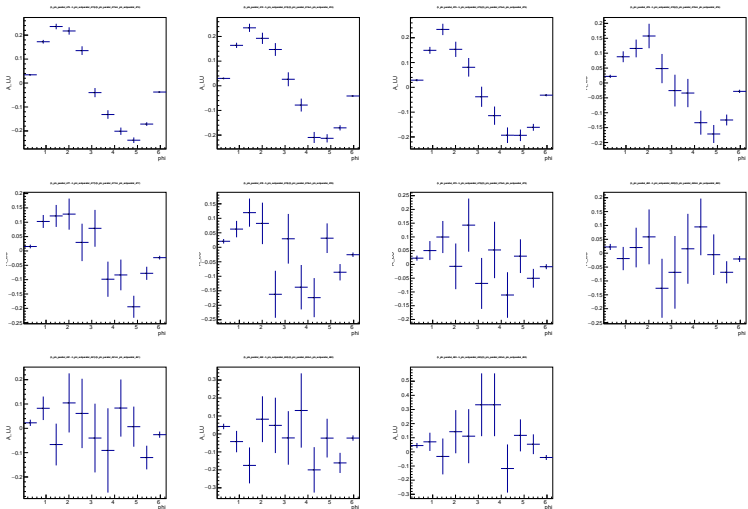
$$1.0 < Q^2 < 1.77828, 0.000251189 < x_B < 0.000398107$$



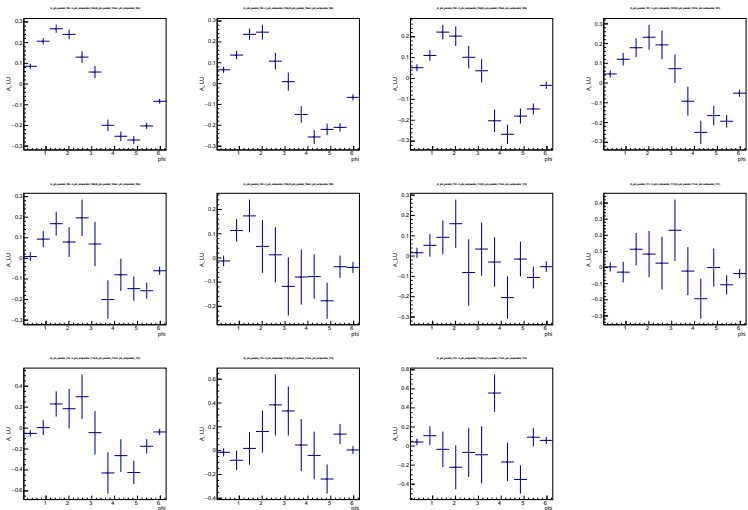
$$1.77828 < Q^2 < 3.16228, 0.000630957 < x_B < 0.001$$



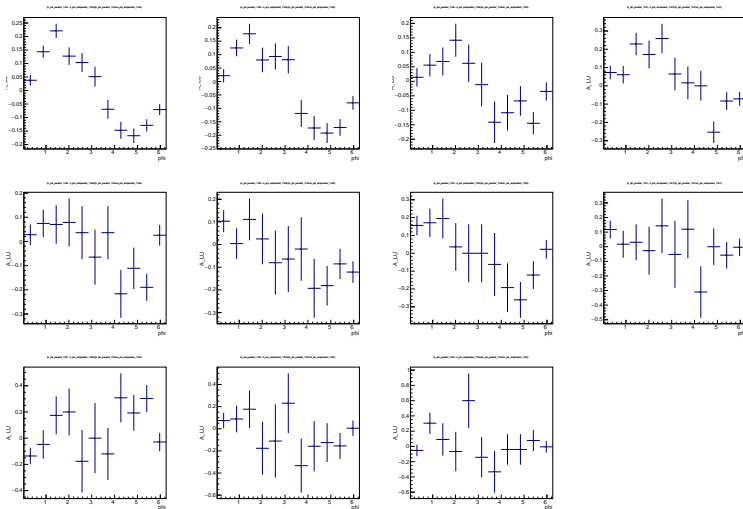
$$3.16228 < Q^2 < 5.62341, 0.001 < x_B < 0.00158489$$



$$5.62341 < Q^2 < 10.0, 0.00251189 < x_B < 0.00398107$$

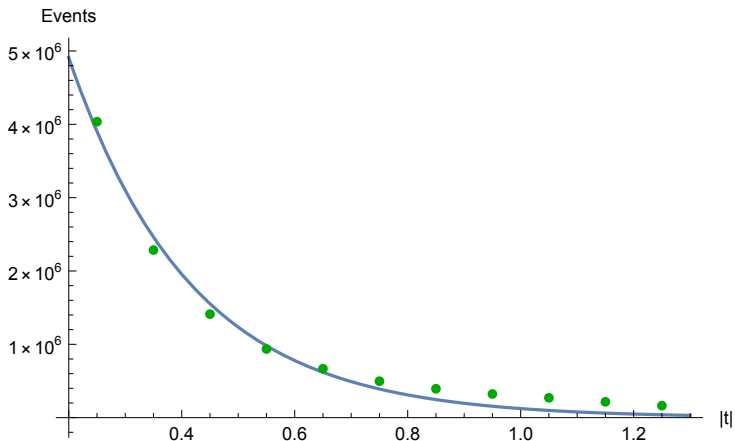


$$17.7828 < Q^2 < 31.6228, 0.00630957 < x_B < 0.01$$



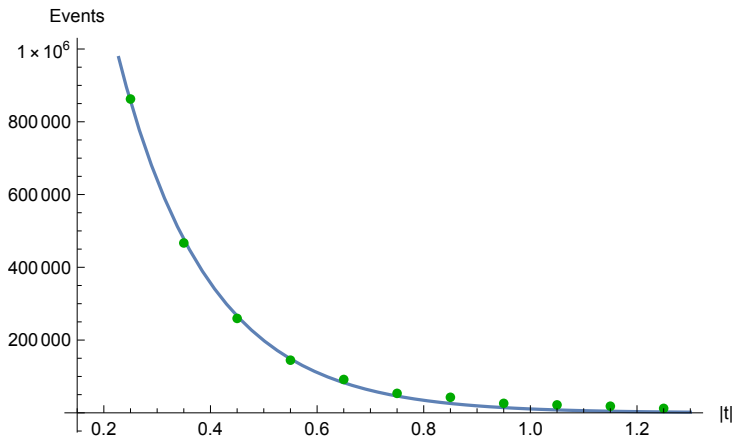
t-slope (DVCS + BH + INT)

Fit the t-slope to the whole phase space: $e^{-b \cdot |t|}$, where $b = 4.60464 \text{ GeV}^{-2}$



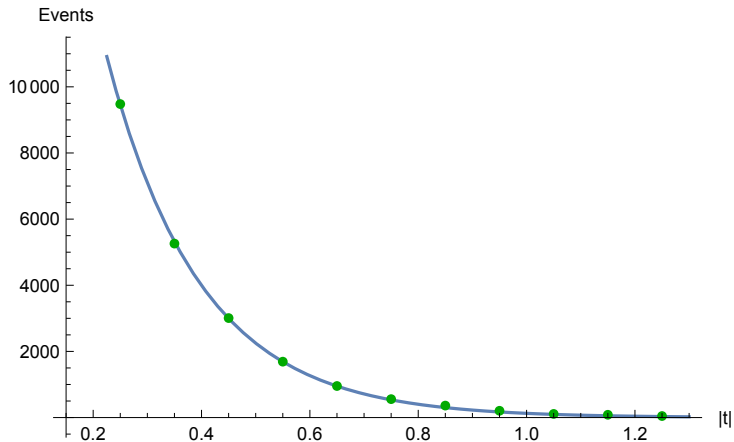
t-slope (BH-subtracted)

Fit the t-slope to the whole phase space: $e^{-b \cdot |t|}$, where $b = 5.84265 \text{ GeV}^{-2}$



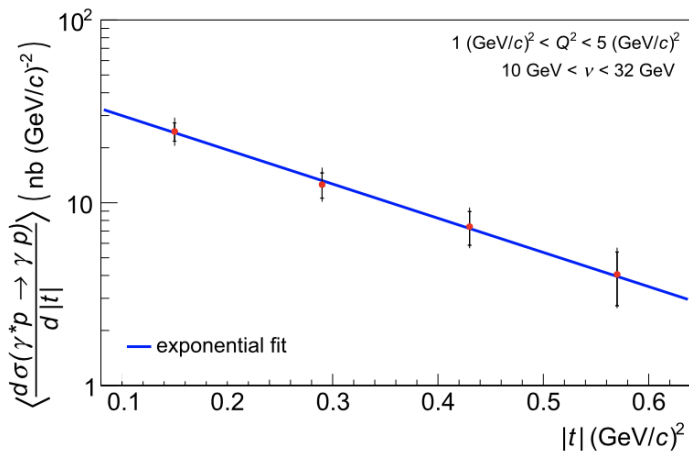
t-slope (BH-subtracted)

Fit the t-slope to $\langle xB \rangle = 0.051453$ and $\langle Q^2 \rangle = 2.47 \text{ GeV}^2$: $e^{-b \cdot |t|}$, where $b = 5.72399 \text{ GeV}^{-2}$



COMPASS t-slope (BH-subtracted)

The t-slope for $\langle W \rangle = 5.8$ GeV, $\langle xB \rangle = 0.056$ and $\langle Q^2 \rangle = 1.8 \text{ GeV}^2$: $e^{-b \cdot |t|}$, where $b = 4.3 \pm 0.6 |_{\text{stat}} \pm 0.1 |_{\text{sys}}$



- Bethe-Heitler amplitude includes singularities

$$|\mathcal{T}_{\text{BH}}|^2 = \frac{1}{x_B y^2 (1 + \epsilon^2) t \mathcal{P}_1(\phi) \mathcal{P}_2(\phi)} \left\{ c_0^{\text{BH}} + \sum_{n=1}^2 c_n^{\text{BH}} \cos(n\phi) + s_1^{\text{BH}} \sin(\phi) \right\}$$

with

$$\mathcal{P}_1(\phi) = 1 + \frac{2k \cdot \Delta}{Q^2} \quad \mathcal{P}_2(\phi) = \frac{t - 2k \cdot \Delta}{Q^2}, \quad \text{where}$$

$$k \cdot \Delta = -\frac{Q^2}{2y(1 + \epsilon^2)} \left\{ 1 + 2K \cos\phi - \frac{t}{Q^2} (1 - x_B(2 - y) + \frac{y\epsilon^2}{2}) + \frac{y\epsilon^2}{2} \right\}$$

$$K^2 = -\frac{t}{Q^2} (1 - x_B) \left(1 - y - \frac{y^2 \epsilon^2}{4} \right) \left(1 - \frac{t_{\text{min}}}{t^2} \right) \left\{ \sqrt{1 + \epsilon^2} + \frac{4x_B(1 - x_B) + \epsilon^2}{4(1 - x_B)} \frac{t - t_{\text{min}}}{Q^2} \right\}$$