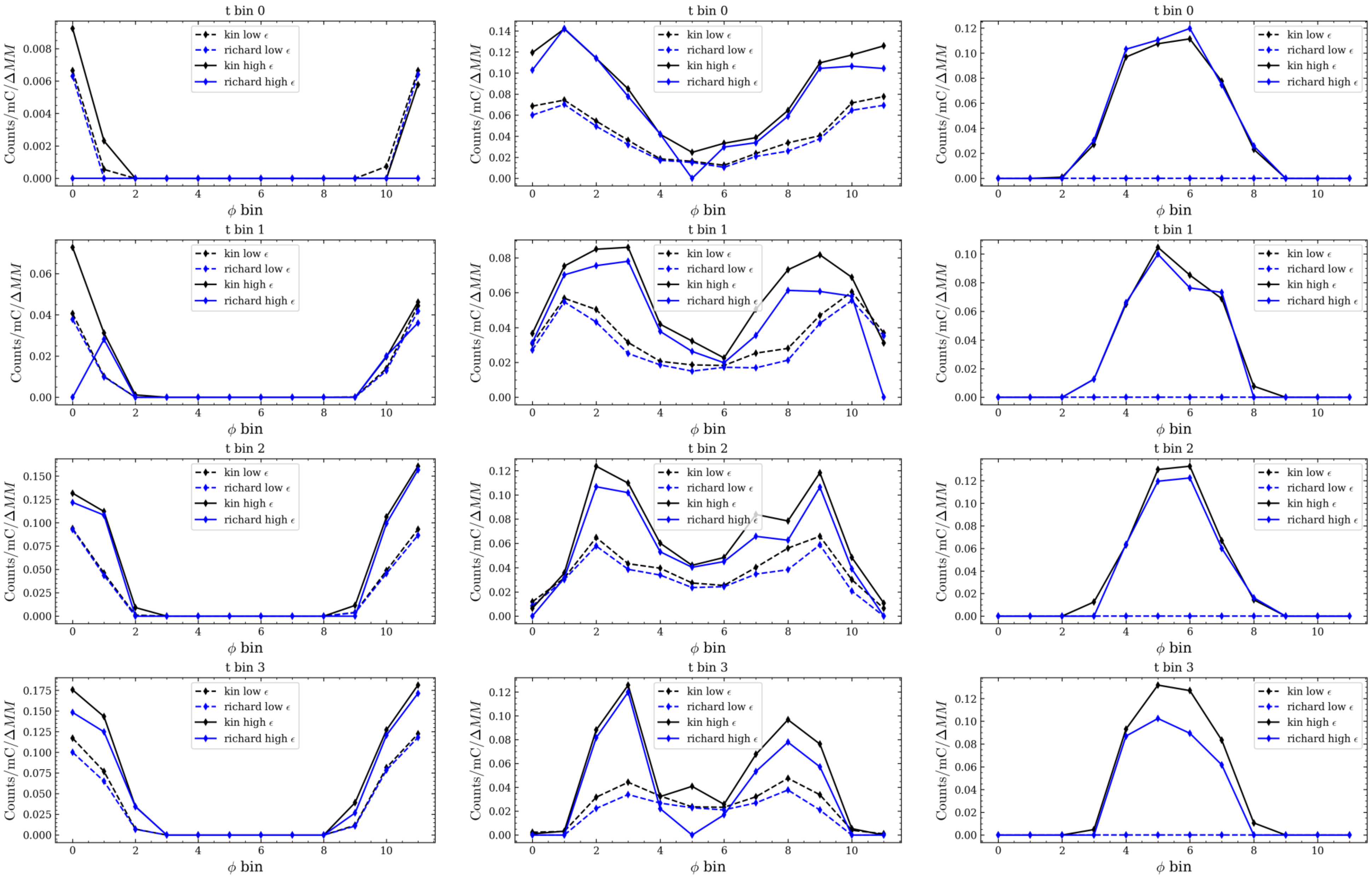
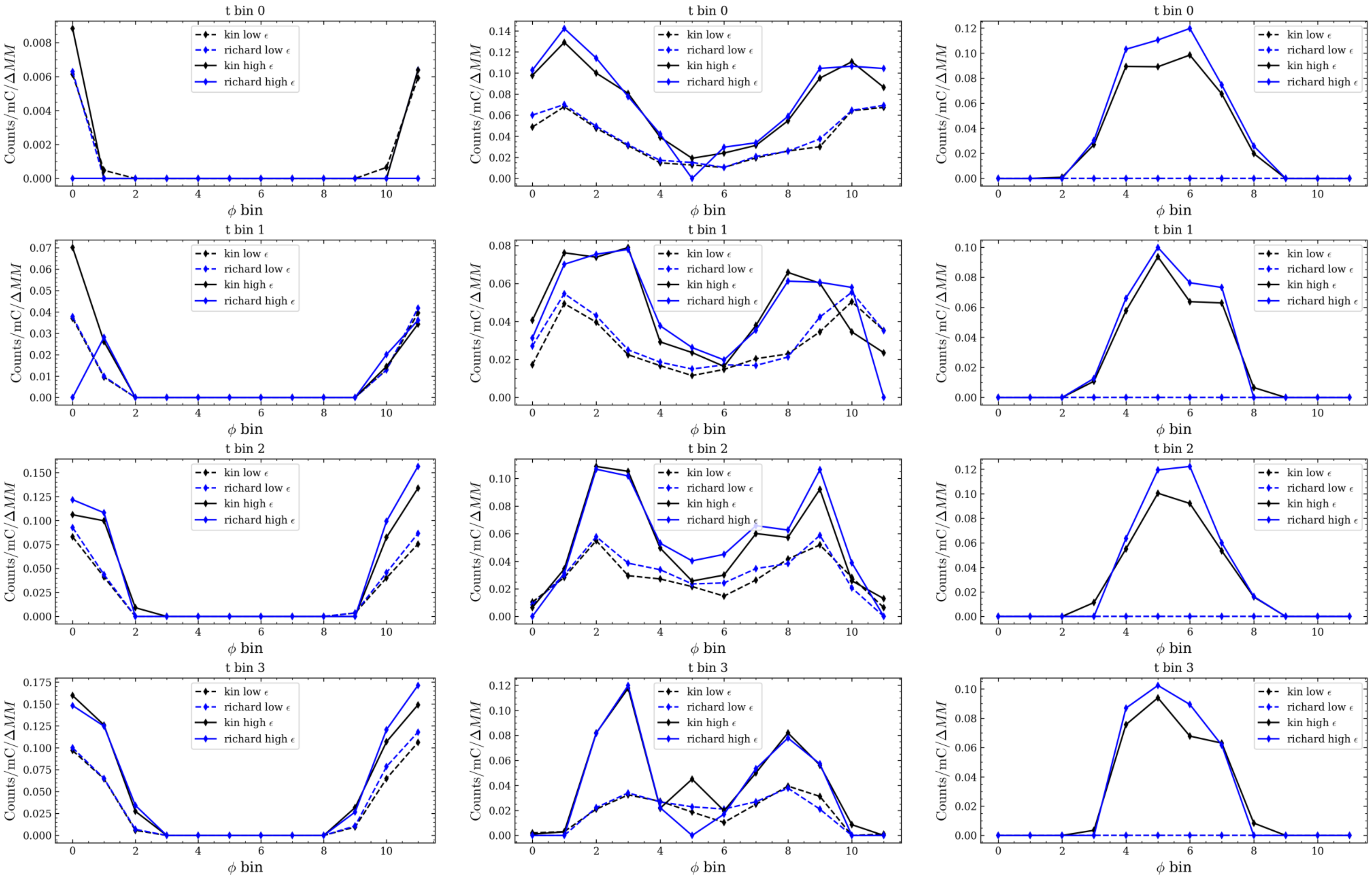
- Black = Kin, Blue = Richard
- Yaxis = Counts/mC

- Black : before subtraction



- Black = Kin, Blue = Richard
- Yaxis = Counts/mC

- Black : after pion subtraction



result for Q^2=3.0, W=3.14 setting

- Only included pion subtraction for this report

✓ Yield checking

- For each SHMS settings:
  - Criteria for Good bins :
    - Yield > 0 & yield_err > 0 & all finite
    - For each kinematic average :
      - Finite value and uncertainty

      (can be –ve after subtraction)

✓ Rerun simc with vertex variable defined

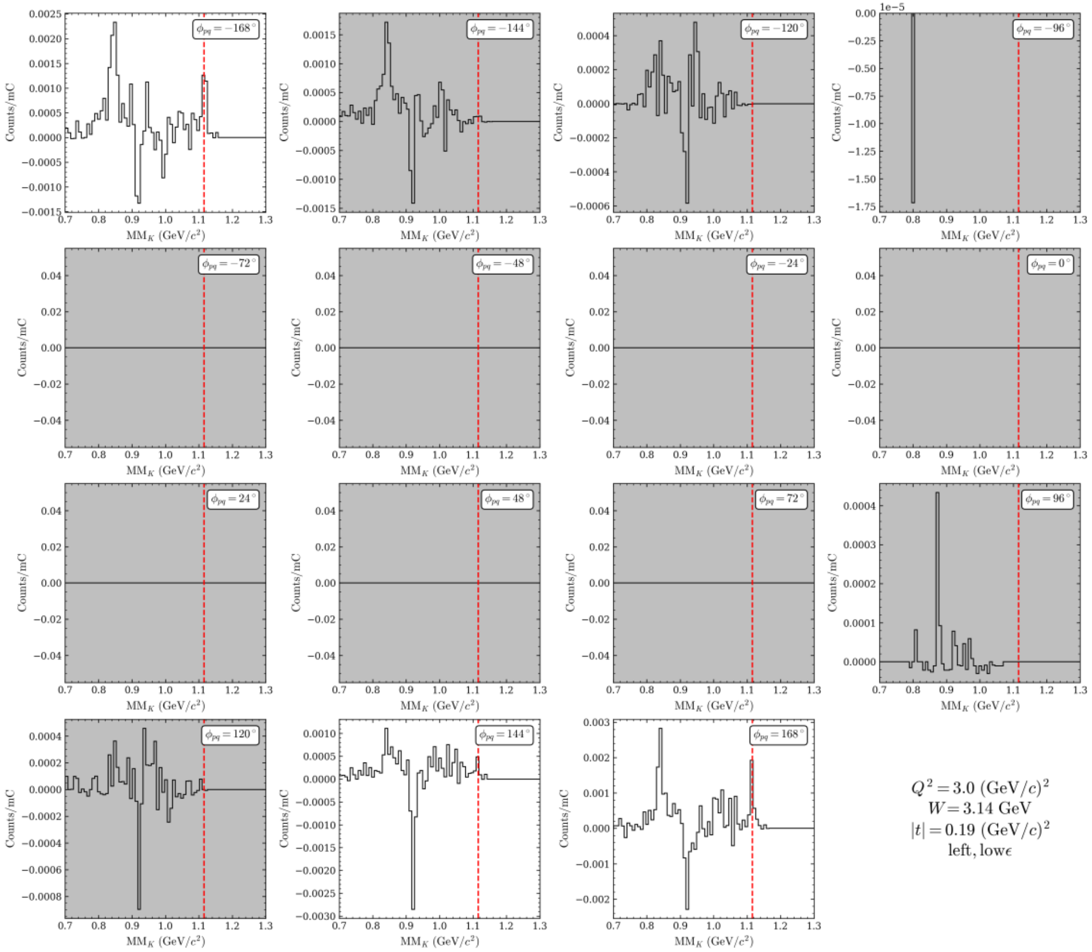
✓ Use vertex theta, phi, t for reweighting

✓ t phi bins are cut on the lab frame

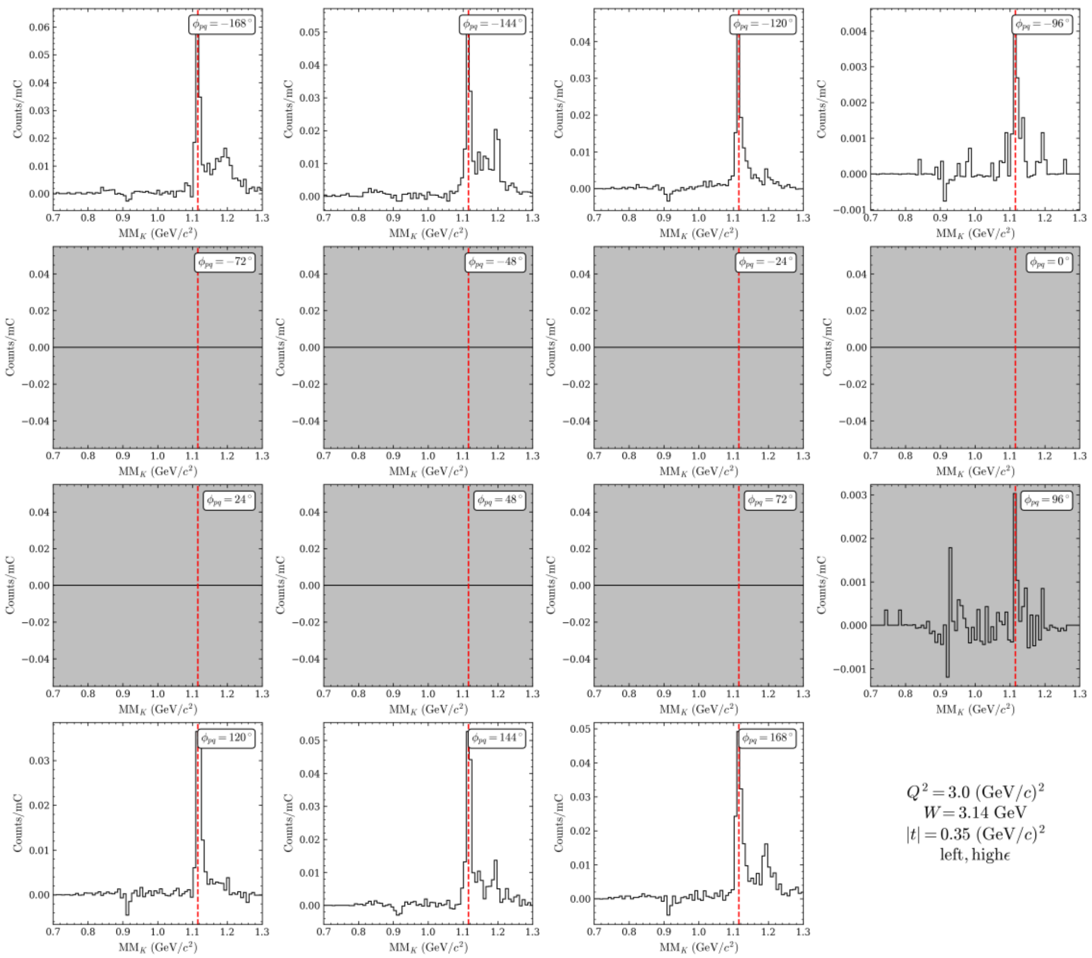

```json
{
    "t_range_lowe": [
        0.1975,
        0.4225
    ],
    "t_range_highe": [
        0.1825,
        0.5325
    ],
    "t_range_combined": [
        0.19,
        0.43
    ],
    "phi_range": [
        -180,
        180
    ],
    "ntbins": 4,
    "nphibins": 15,
    "phi_min_coverage": 0.4
}
```

Check yields after subtraction : Left, Lowe

tbin = 0



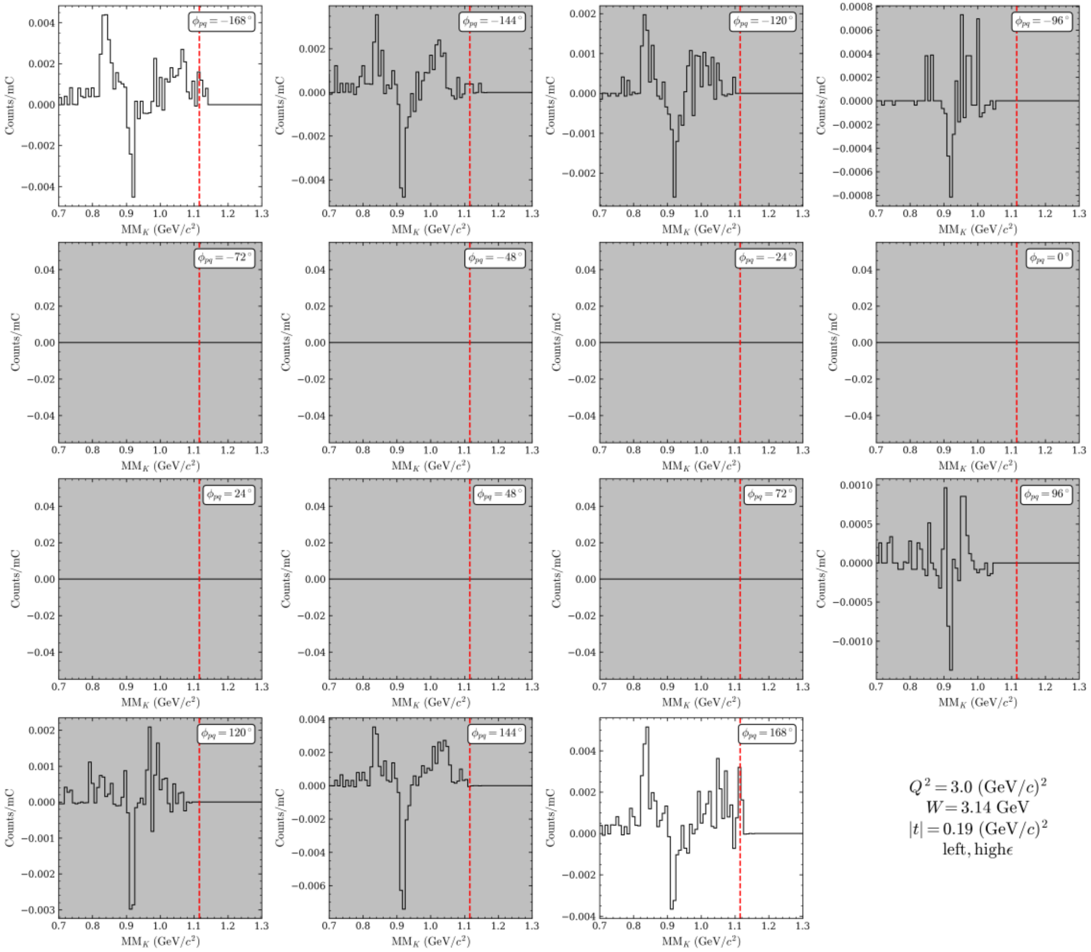
tbin = 1



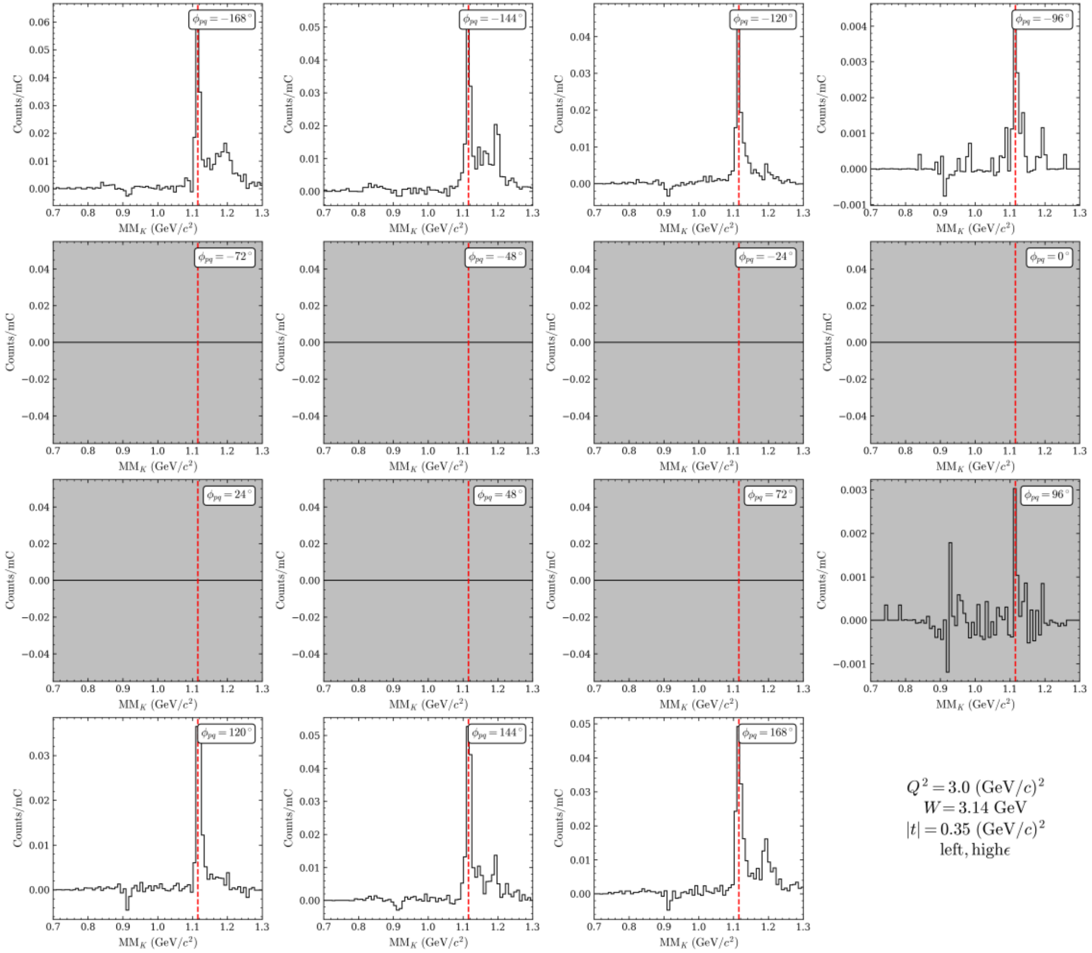
- bins in small |-t| has very low count /mC due to low statistics + pion subtraction (100%)

Check yields after subtraction : Left, Highe

tbin = 0



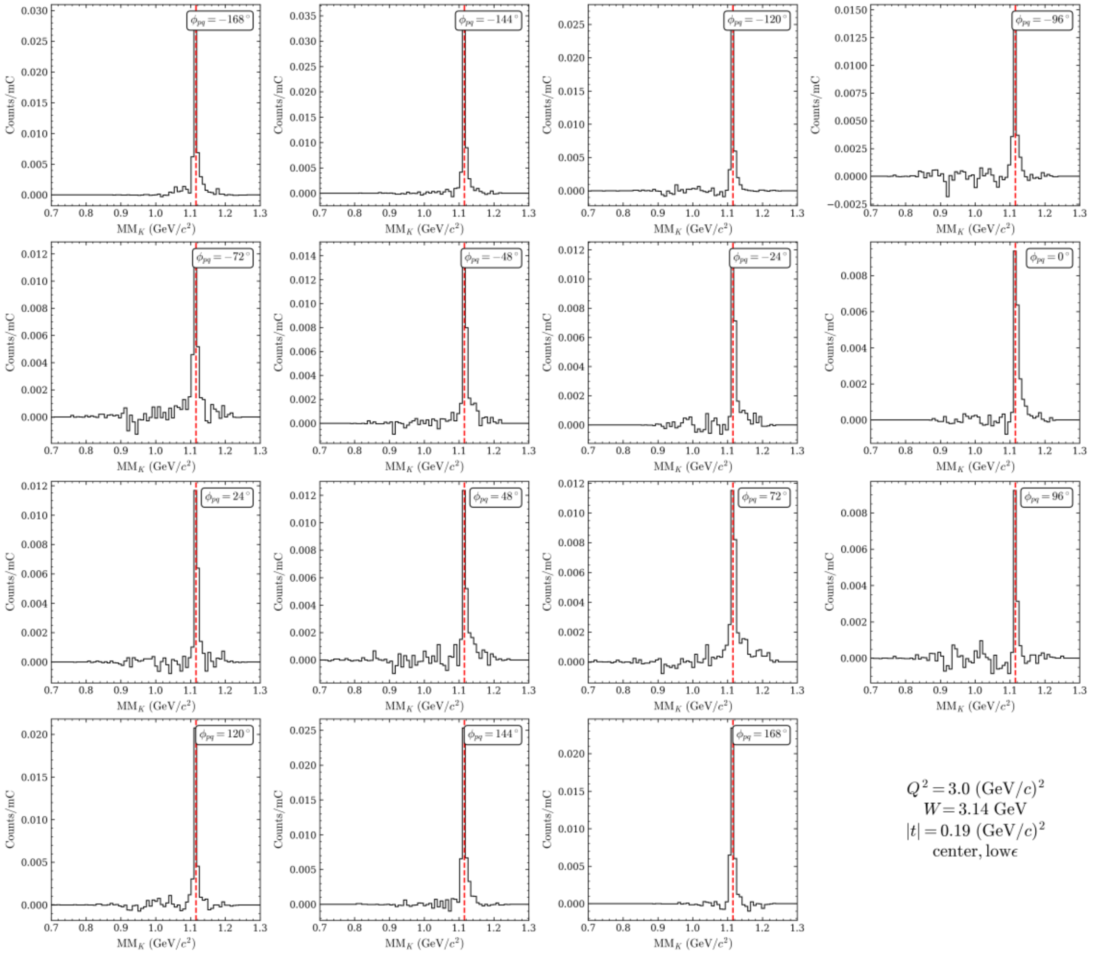
tbin = 1



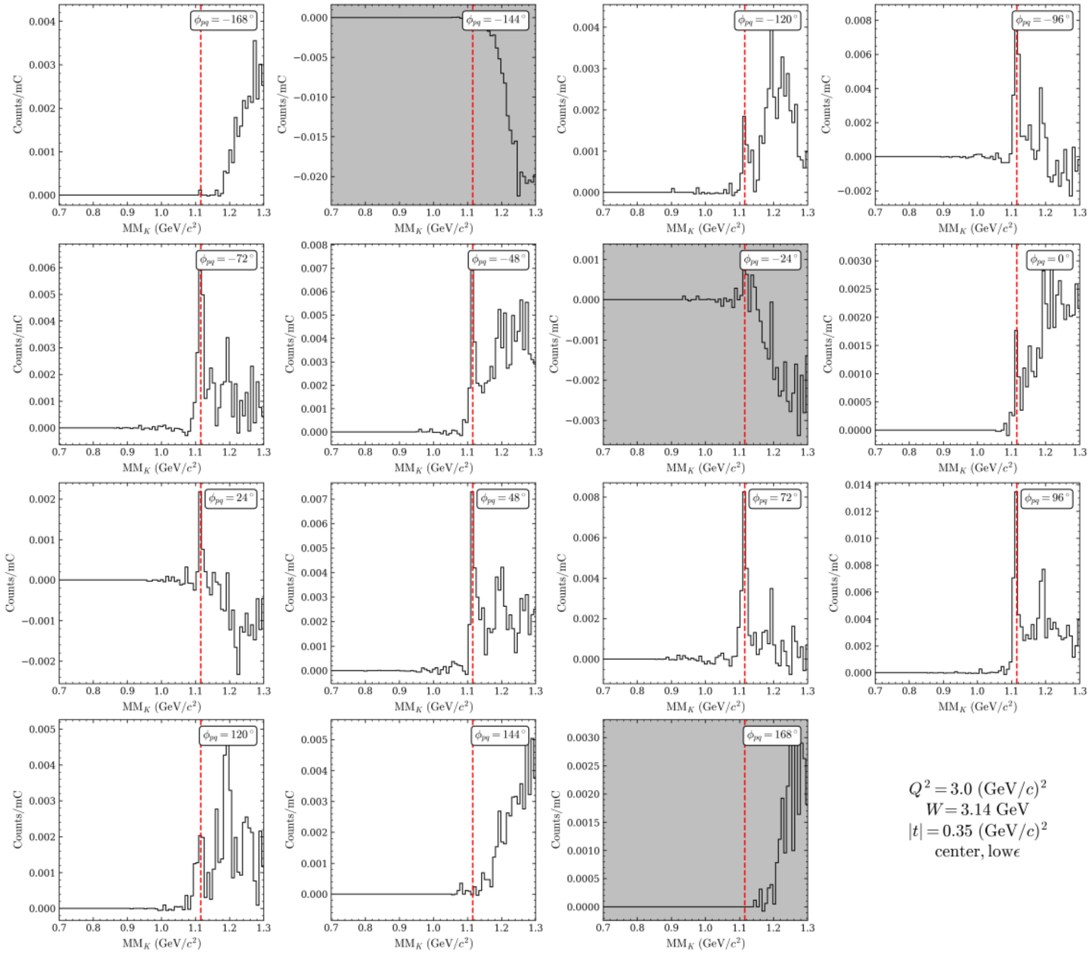
- similar

Check yields after subtraction : Center, Lowe

tbin = 0



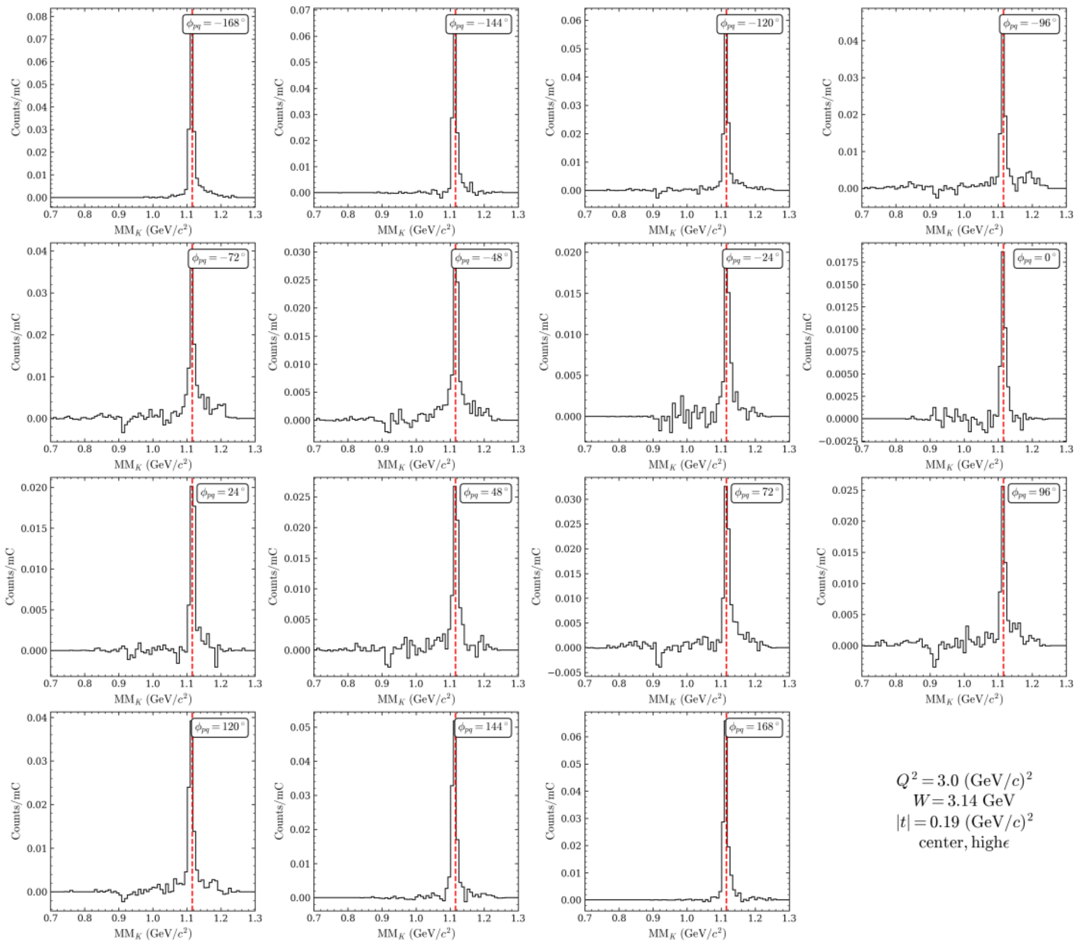
tbin = 3



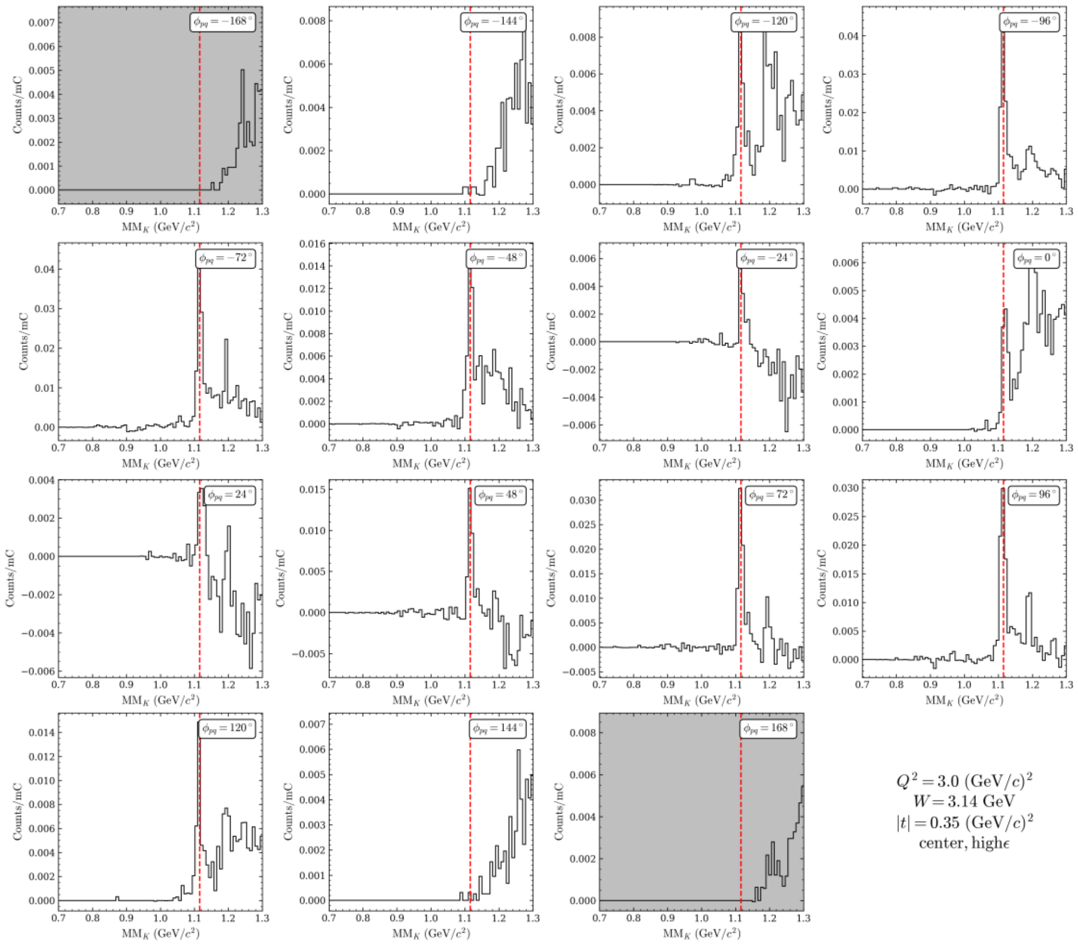
- Bad bins are removed correctly.

Check yields after subtraction : Center, Highe

tbin = 0



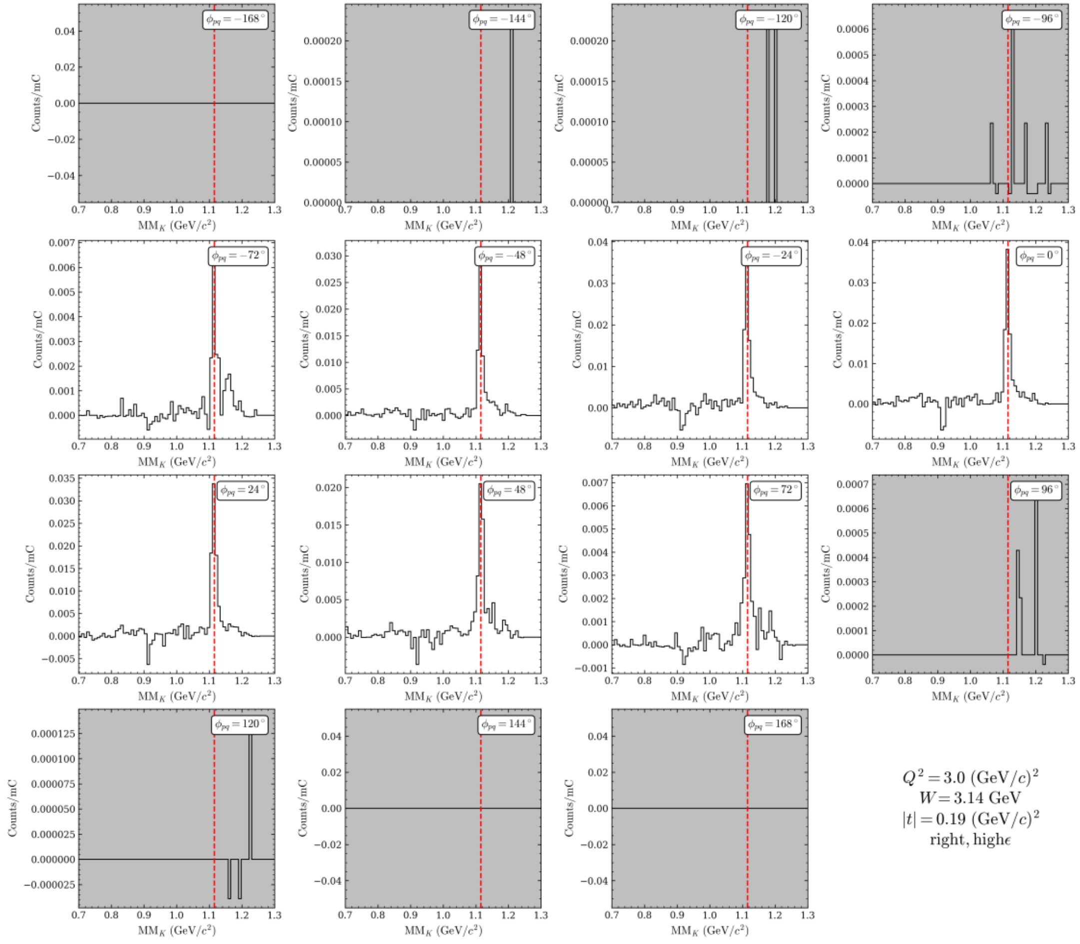
tbin = 3



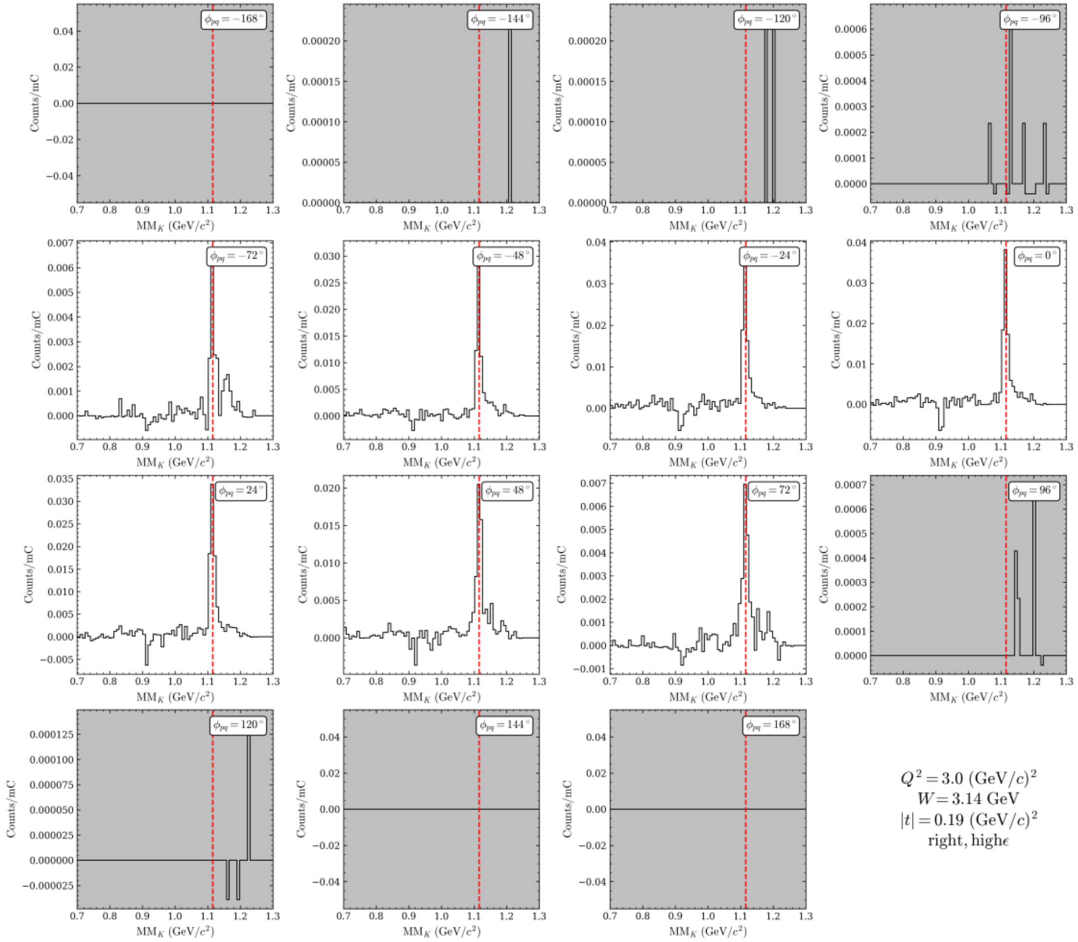
- Bad bins are removed correctly.

Check yields after subtraction : Right, Highe

tbin = 0



tbin = 3



- Bad bins are removed correctly.

Closure test

$$\sigma_L = \frac{p_1|t|}{(|t| + m_K^2)^2} \exp(-|p_2 t|)$$

$$\sigma_T = \frac{p_5}{|t|^{p_6}} \exp(-|p_7 t|)$$

$$\sigma_{LT} = \frac{p_9}{|t|}$$

$$\sigma_{TT} = \frac{p_{13}}{|t|^{p_{14}}} \exp(-|p_{15} t|)$$

$$w = \frac{1.0}{(W^2 - m_{tar}^2)^{0.85W^2 - 5.97W + 12.68}}$$

- Original functional form.

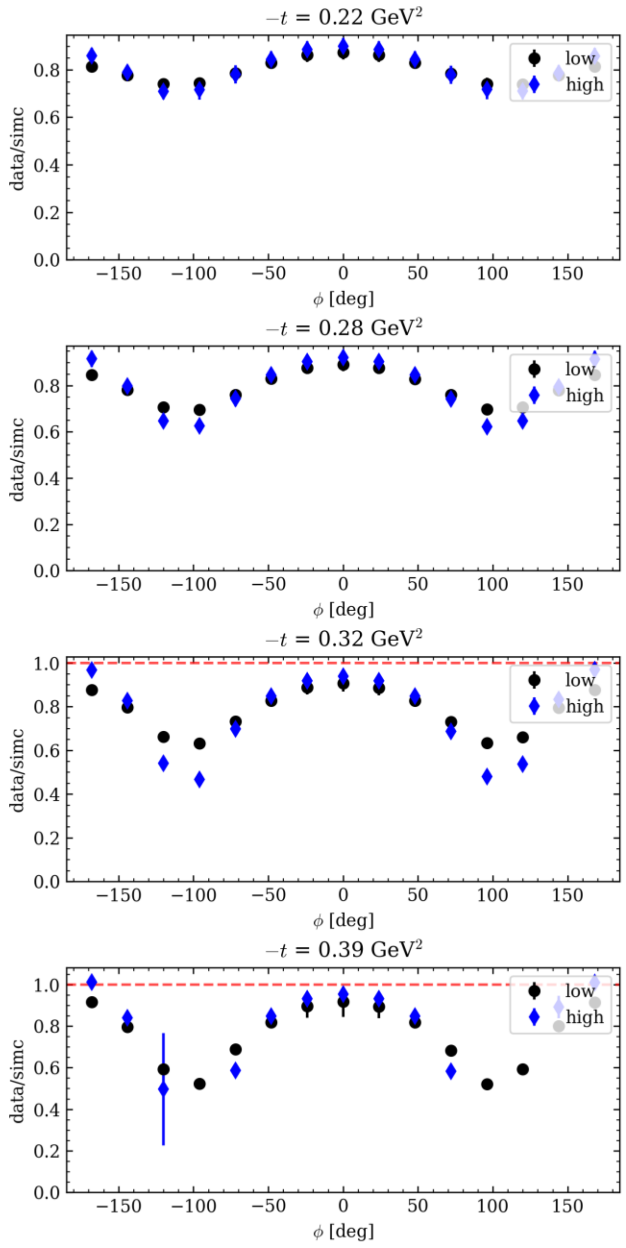
```
3.66352000000000110e+00
-2.46241999999999831e+00
0.00000000000000000e+00
0.00000000000000000e+00
6.22905000000000420e-01
1.80316000000000096e+00
-1.04335999999999994e-06
-5.26738000000000395e-01
9.54658000000000066e-01
0.00000000000000000e+00
-1.85133000000000098e+02
0.00000000000000000e+00
3.78851999999999754e+02
-2.53318999999999831e+00
-5.27111999999999806e+00
1.85369999999999916e-08
```

- Run SIMC to get root file

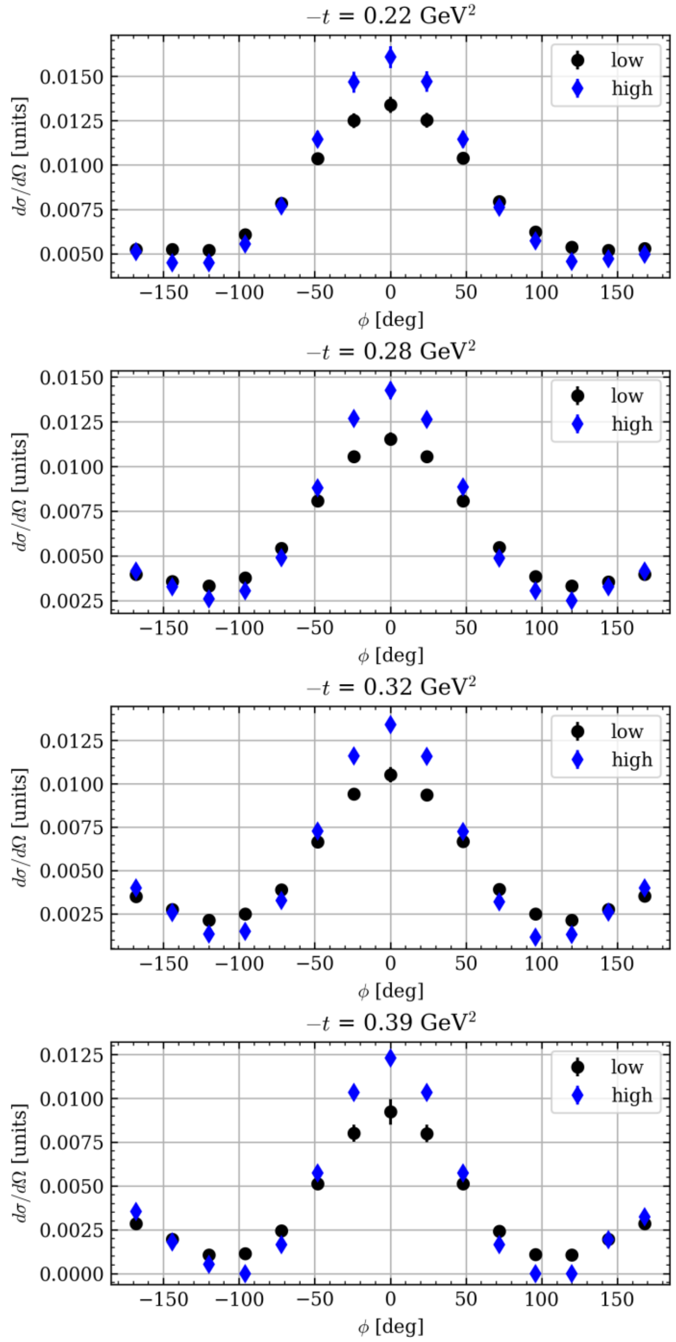
perturb

```
3.64572361738669625 8e+00
```

- Reweight to get some **pseudo** data yield

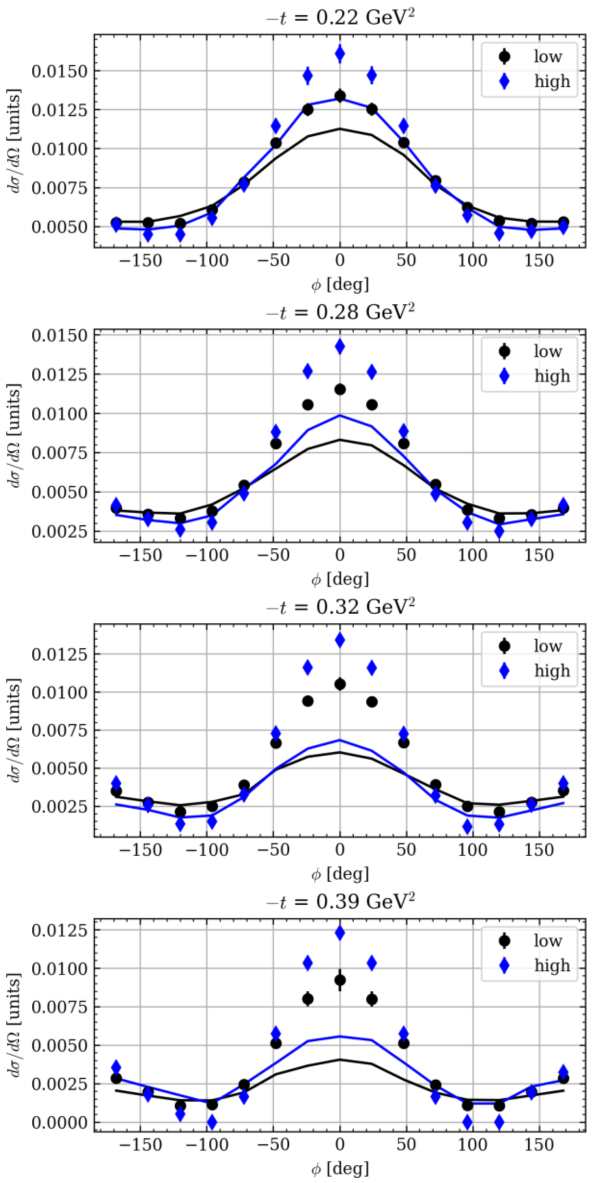


- Multiply model sigma



- Ratio is now wiggly

Rosenbluth fit



$$\boxed{2\pi \frac{d\sigma}{dt d\phi} = \varepsilon \frac{d\sigma_L}{dt} + \frac{d\sigma_T}{dt} + \sqrt{2\varepsilon(\varepsilon+1)} \frac{d\sigma_{LT}}{dt} \cos\phi + \varepsilon \frac{d\sigma_{TT}}{dt} \cos 2\phi}$$

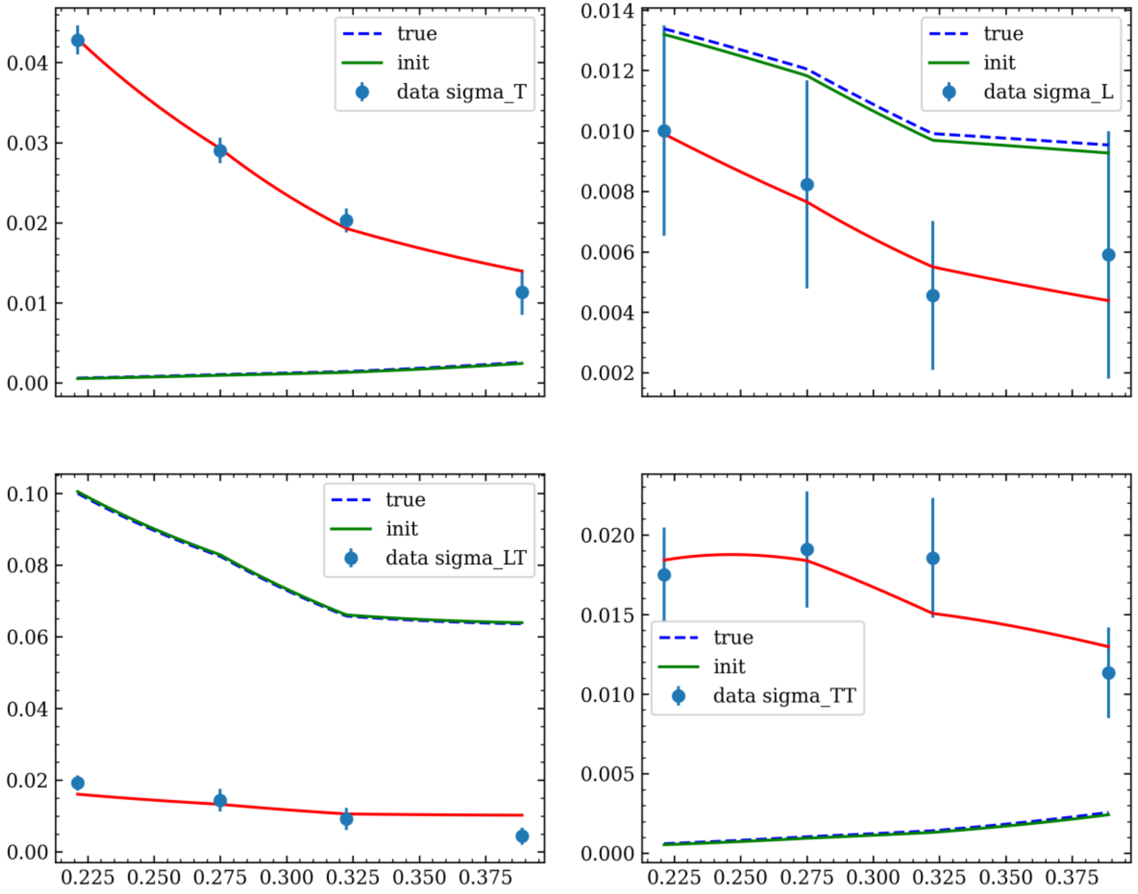
$$\sigma_{L0} = \frac{\epsilon_{low}\sigma_{high} - \epsilon_{high}\sigma_{low}}{\epsilon_{low} - \epsilon_{high}}$$

$$\sigma_{T0} = \frac{\sigma_{low} - \sigma_{high}}{\epsilon_{low} - \epsilon_{high}}$$

$$\sigma_{LT} = \rho_{LT}\sqrt{\sigma_L \sigma_T}$$

$$\sigma_{TT} = \rho_{TT}\sigma_T$$

- How to make sure this step is physical ?



- Points = fit from Rosenbluth Eqn
- Red = fitting $\sigma(|-t|)$ using the pts
- Blue dotted = true σ using the perturbed parameters

$$\sigma_L = \frac{p_1|t|}{(|t|+m_K^2)^2}\exp(-|p_2 t|)$$

$$\sigma_T = \frac{p_5}{|t|^{p_6}}\exp(-|p_7 t|)$$

$$\sigma_{LT} = \frac{p_9}{|t|}$$

$$\sigma_{TT} = \frac{p_{13}}{|t|^{p_{14}}}\exp(-|p_{15} t|)$$

$$w = \frac{1.0}{(W^2 - m_{tar}^2)^{0.85W^2 - 5.97W + 12.68}}$$

- Rosenbluth fit does NOT always get the result with sigmaL, T >> sigma_LT,TT