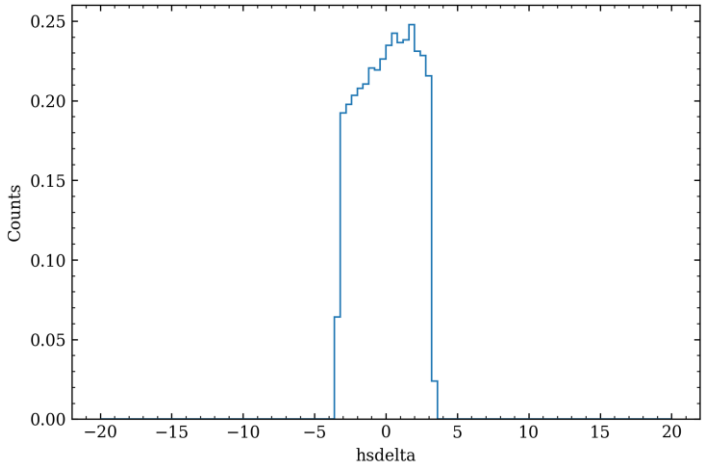
- ❑ Drafting paper
- ❑ Systematic study Q2=3.0, W=3.14, only in SIMC

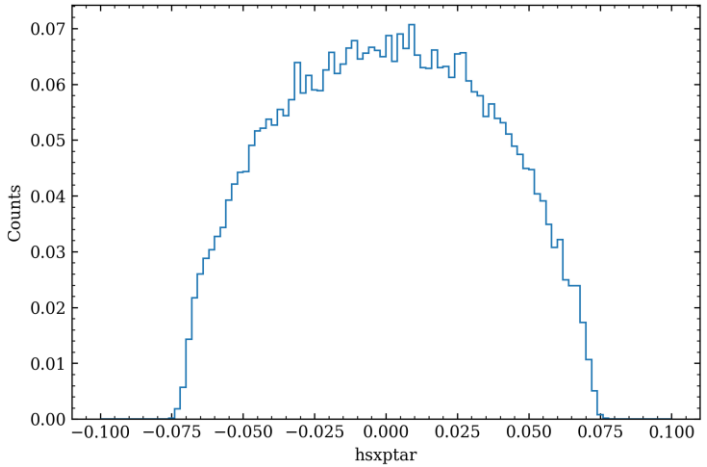
  - Vary one of them while using nominal cut for everything else
    - ❑ Acceptance
    - ✓ mm_cut
    - ✓ diamond cut
    - ? Binning in t
    - ? hgcer_hole cut

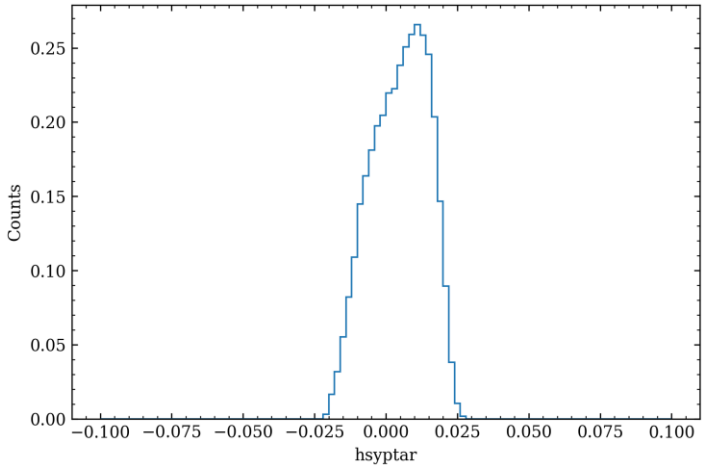
Acceptance cut

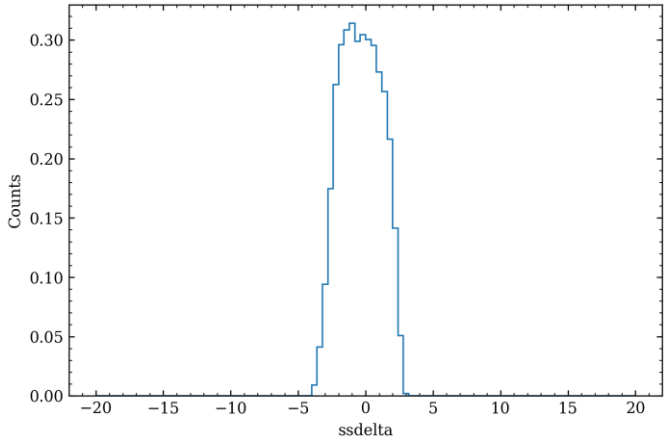
```
nominal_cuts = {
    # SHMS_Acceptance
    "P_gtr_dp": (-10.0, 20.0),
    "P_gtr_th": (-0.06, 0.06),
    "P_gtr_ph": (-0.04, 0.04),

    # HMS_Acceptance
    "H_gtr_dp": (-8.0, 8.0),
    "H_gtr_th": (-0.08, 0.08),
    "H_gtr_ph": (-0.045, 0.045),
}
```

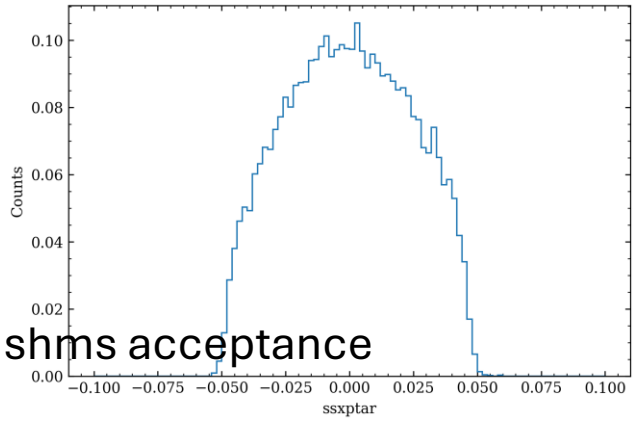
```
    # SHMS_Acceptance
    "P_gtr_dp": "ssdelta",
    "P_gtr_th": "ssxptar",
    "P_gtr_ph": "ssyptar",
    # HMS_Acceptance
    "H_gtr_dp": "hsdelta",
    "H_gtr_th": "hsxptar",
    "H_gtr_ph": "hsyptar",
}
```

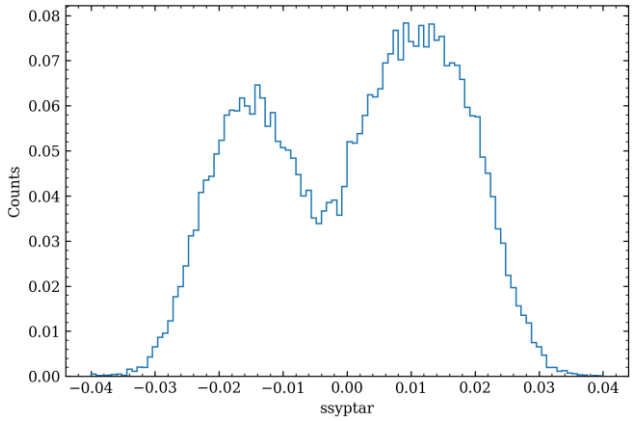






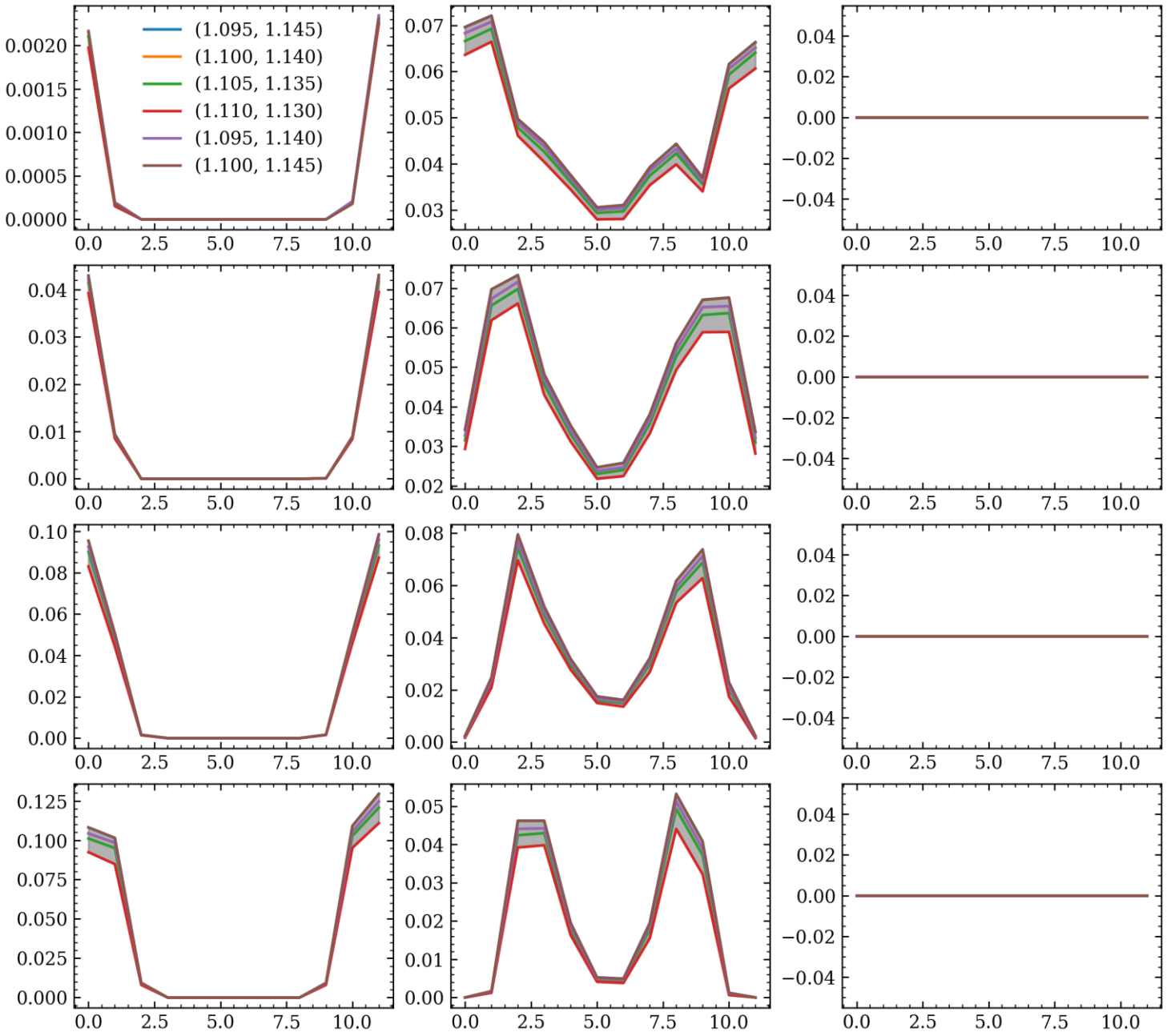




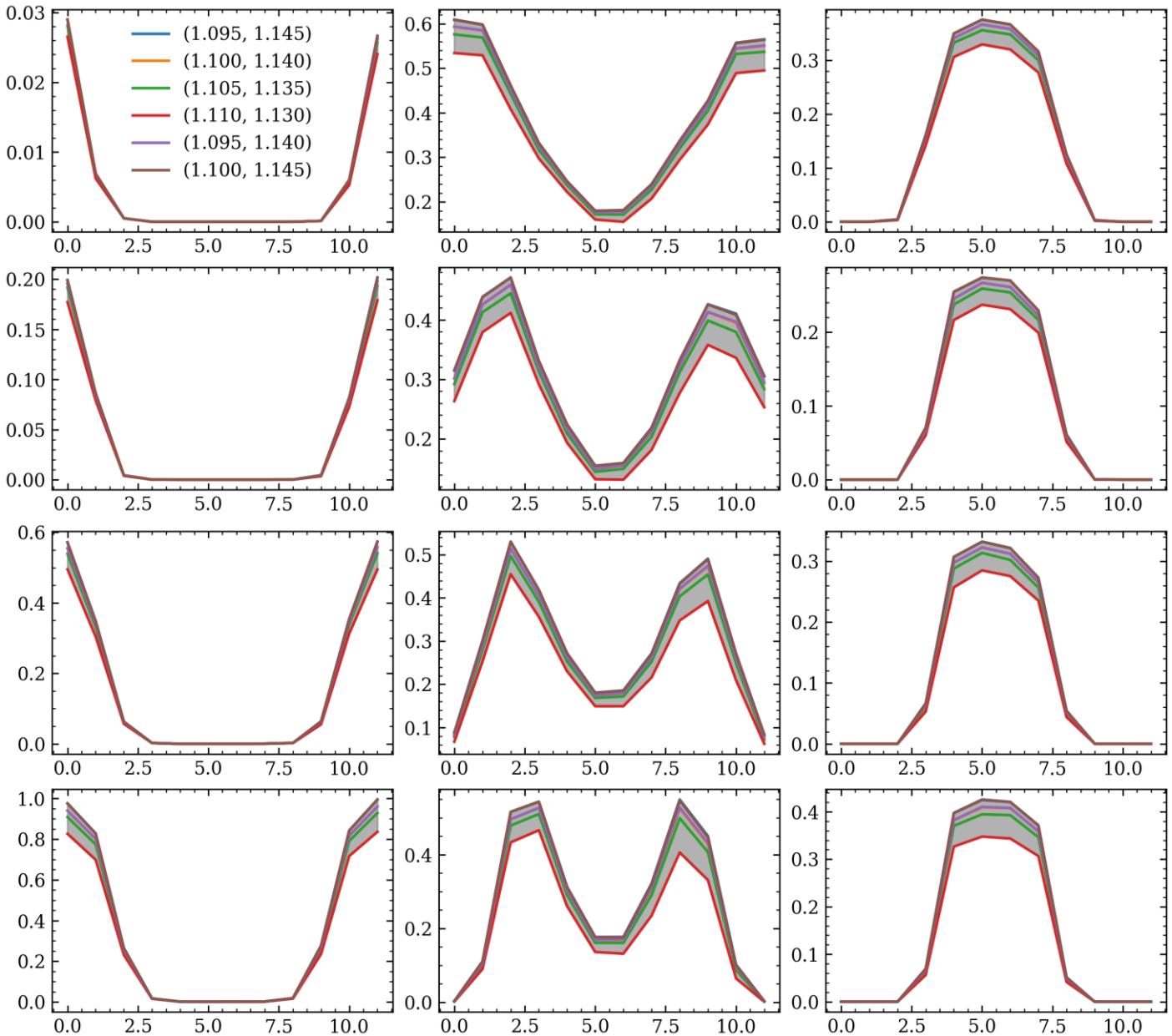


- In simc, all histogram are already within hms, shms acceptance

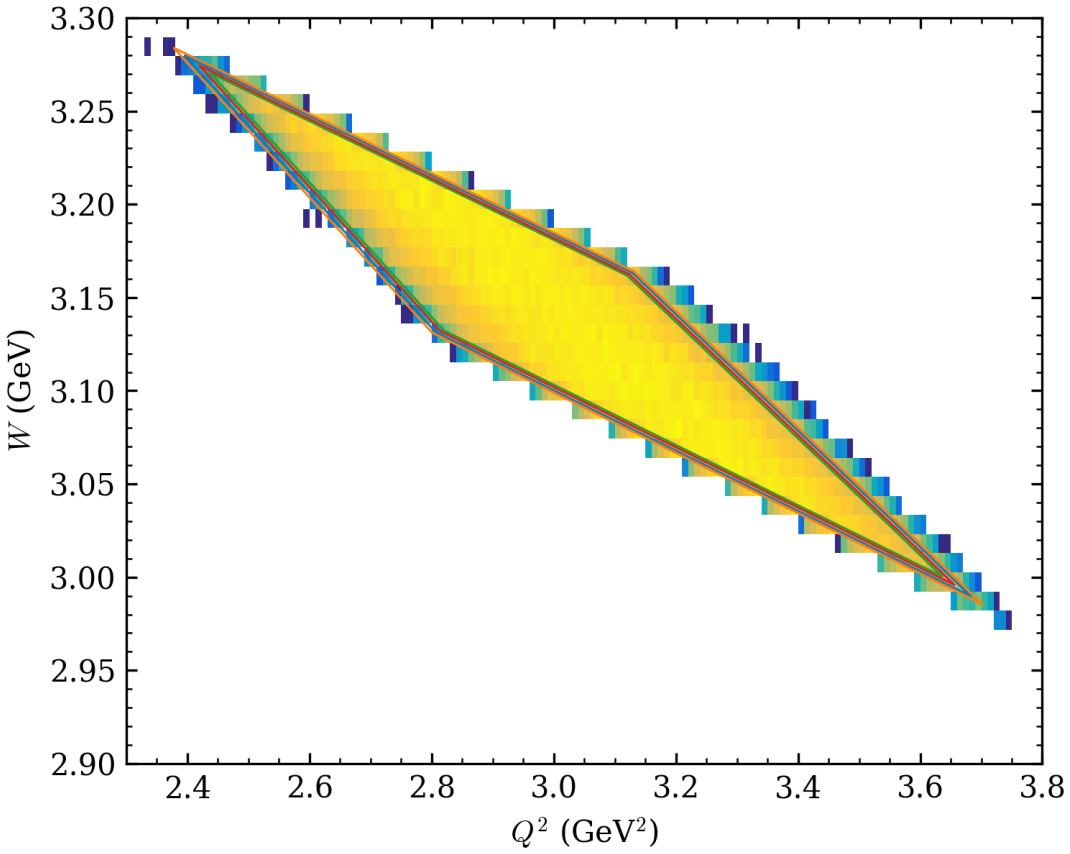
```
"""
Vary Missing mass cut while having nominal cut
"""
for i, mm_cut_ in enumerate([
    [1.095, 1.145],
    [1.10, 1.14],
    [1.105, 1.135],
    [1.11, 1.13],
    [1.095, 1.14],
    [1.10, 1.145]
]):
```



```
"""
Vary Missing mass cut while having nominal cut
"""
for i, mm_cut_ in enumerate([
    [1.095, 1.145],
    [1.10, 1.14],
    [1.105, 1.135],
    [1.11, 1.13],
    [1.095, 1.14],
    [1.10, 1.145]
]):
```



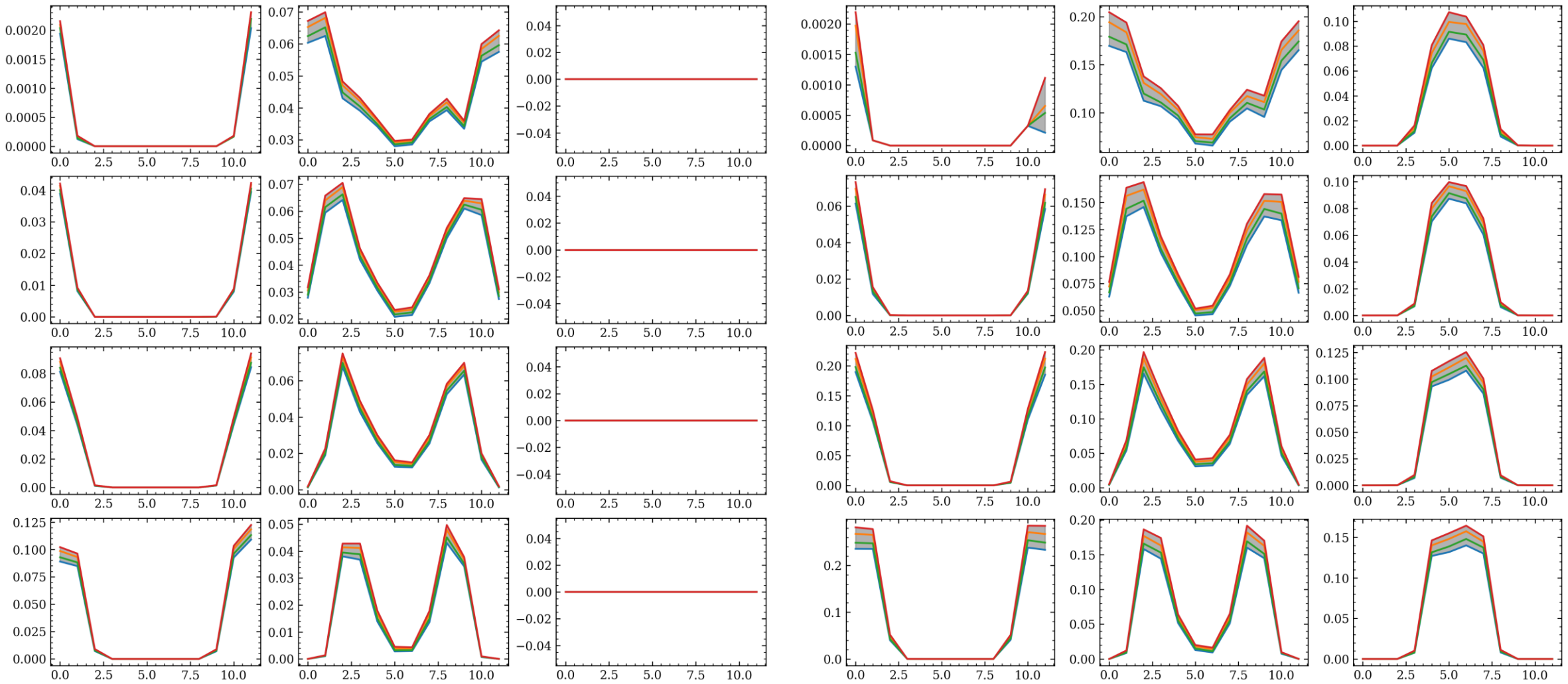
diamond cut



- Polygon, more than 4 pts here
- Get slightly smaller and larger polygon (2 and 5 %)

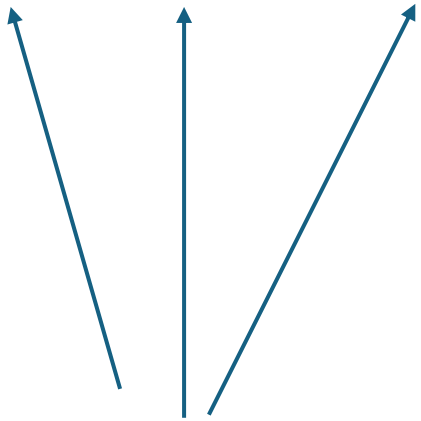
```
for pts in diamond_pts:
    x_new = x_centroid + factor * (pts[0] - x_centroid)
    y_new = y_centroid + factor * (pts[1] - y_centroid)
    new_pts.append((x_new, y_new))
```

diamond cut

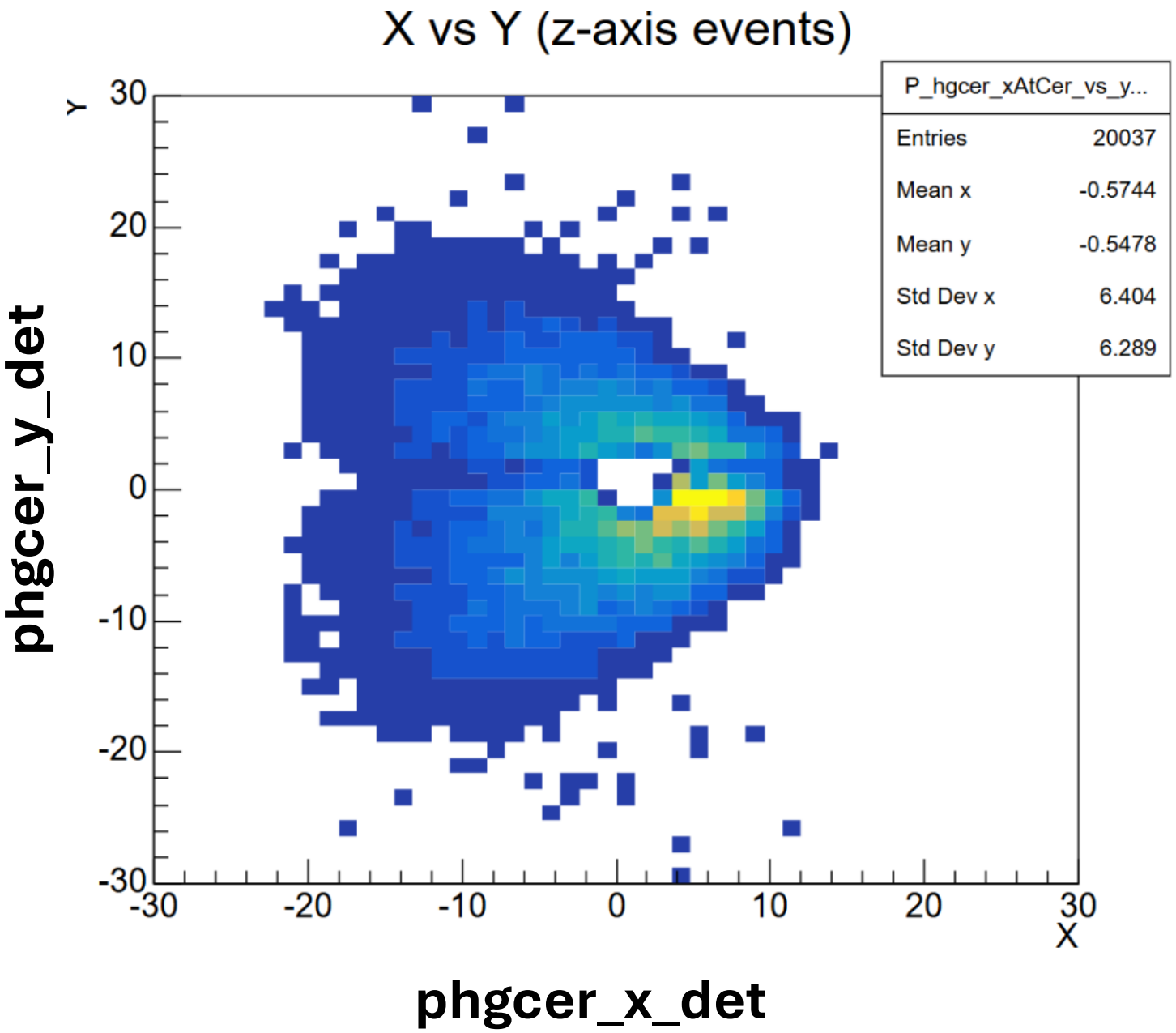


Binning in t

- Nominal t cut = [0.19 0.2575 0.2975 0.3475 0.43]



  - Shift the internal boundaries by 0.2 * average bin size = 0.012
  - All combinations -- Ongoing


X vs Y (z-axis events)
P_hgcer_xAtCer_vs_y...
Entries 20037
Mean x -0.5744
Mean y -0.5478
Std Dev x 6.404
Std Dev y 6.289
Y
30
20
10
0
-10
-20
-30
-30
-20
-10
0
10
20
30
X
phgcer_y_det
phgcer_x_det