



Possible Modifications of Q_{ch} Cut

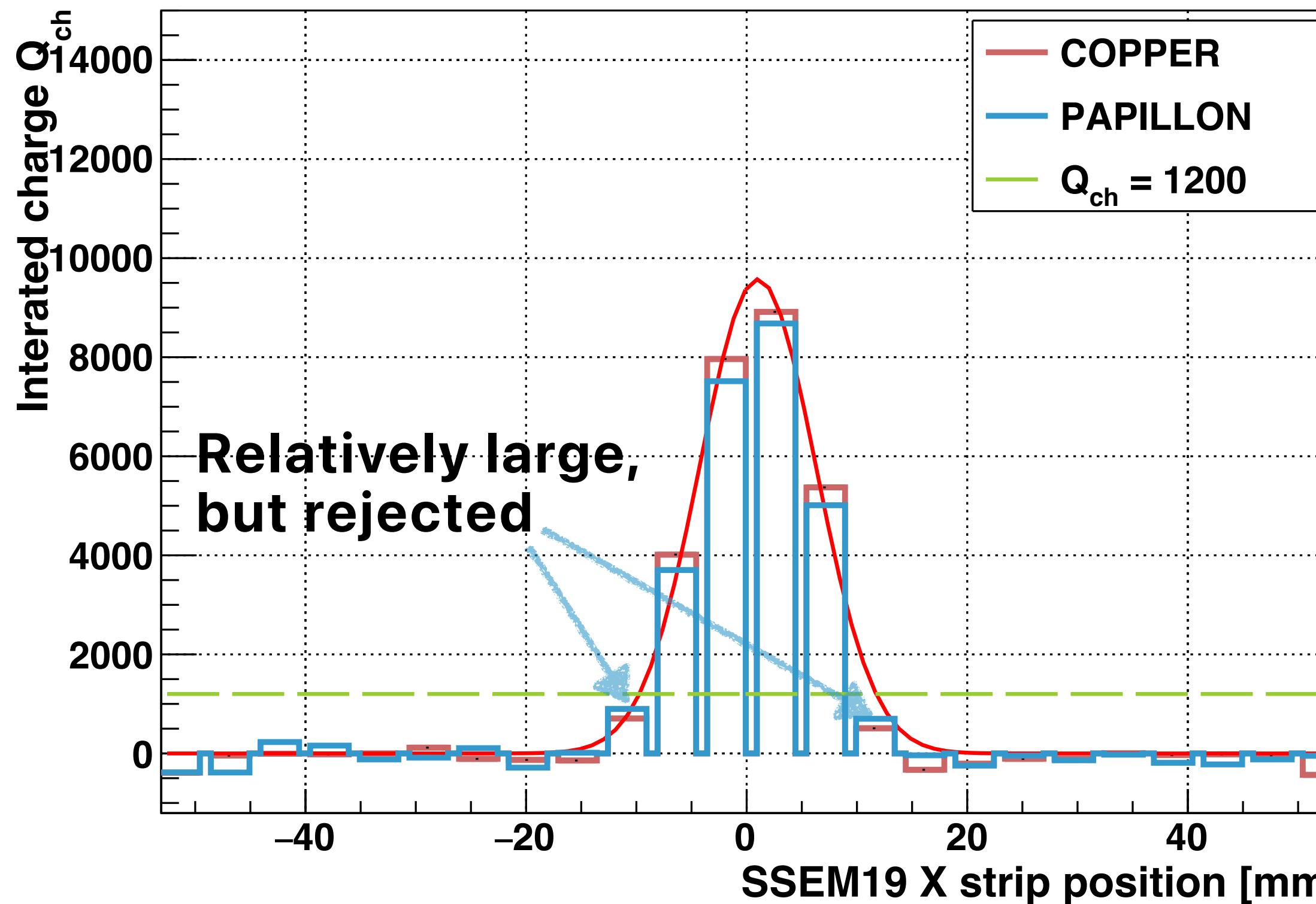
Seidai Tairafune
(Tohoku University)
Jan. 11, 2024

Comparison of Beam Profile (large discrepancy case)

Beam width

PAPILLON : 4.35 mm

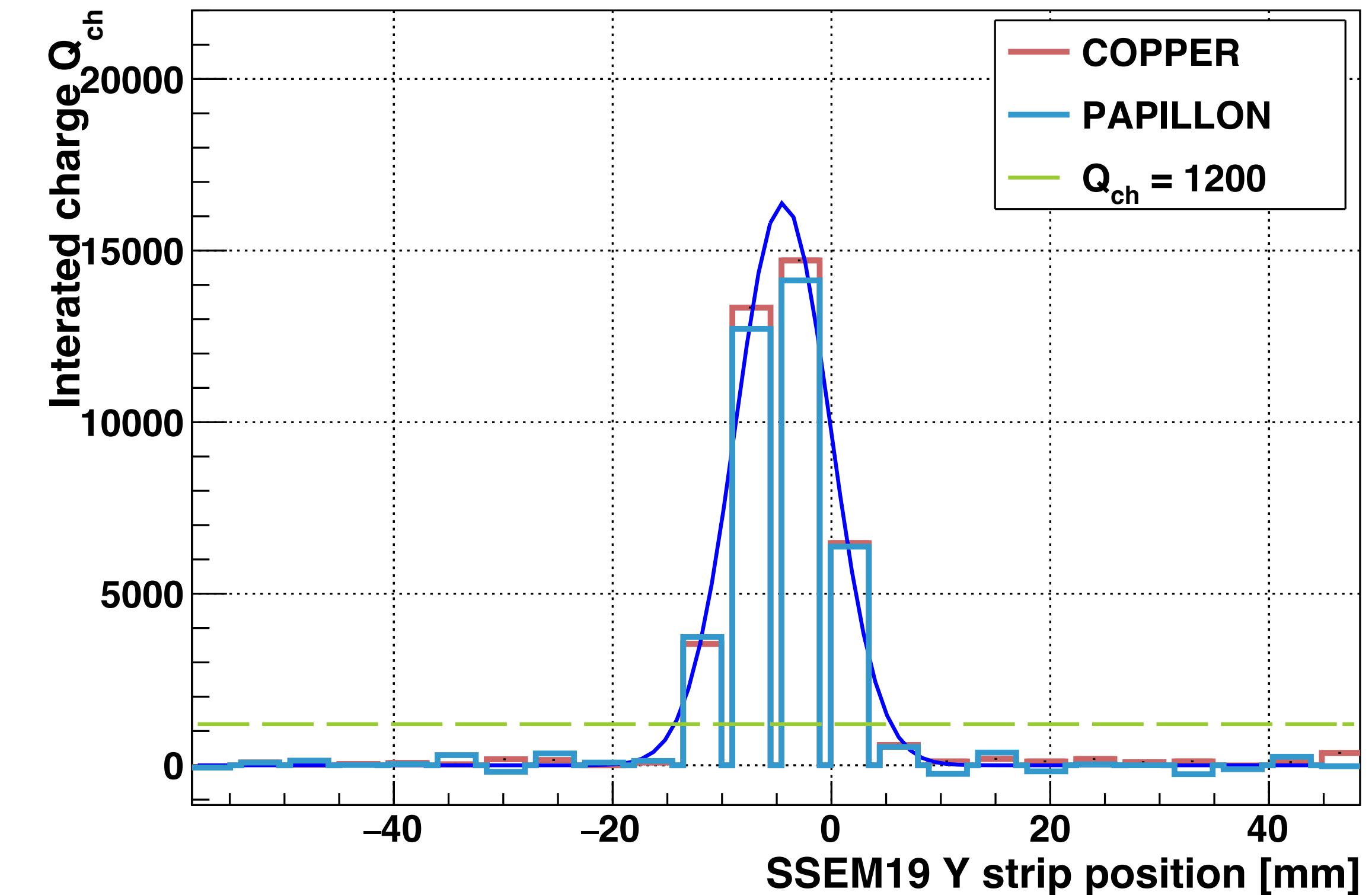
Offline analysis : 5.24 mm



Beam width

PAPILLON : 3.96 mm

Offline analysis : 4.29 mm

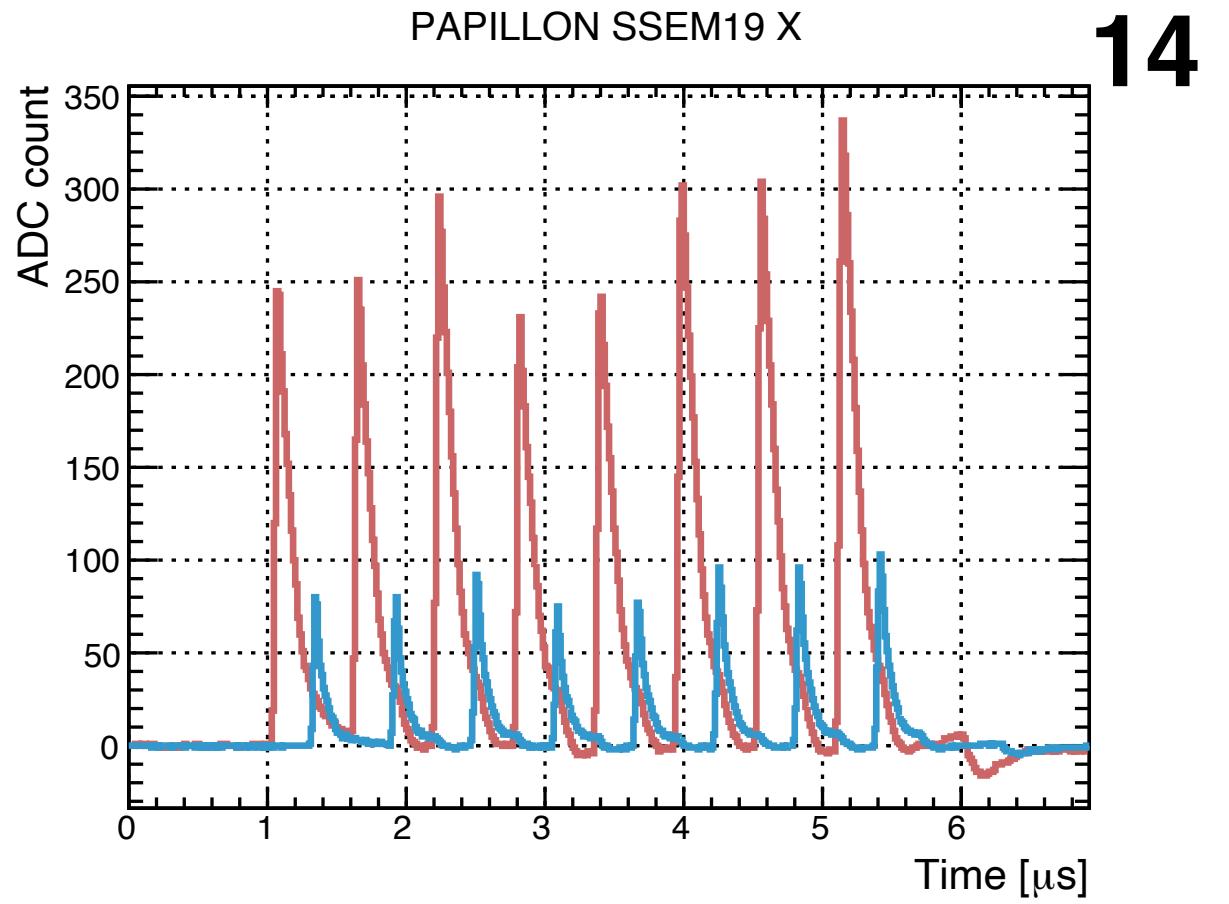
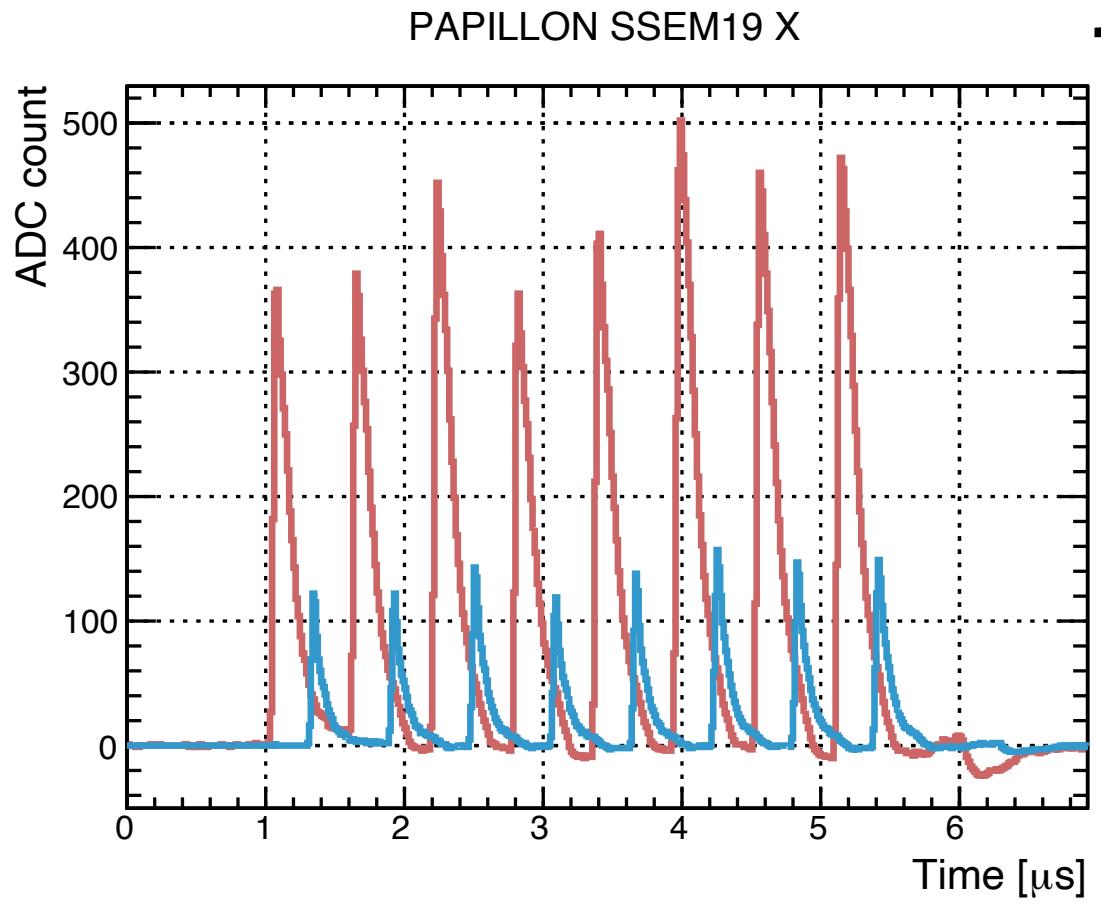
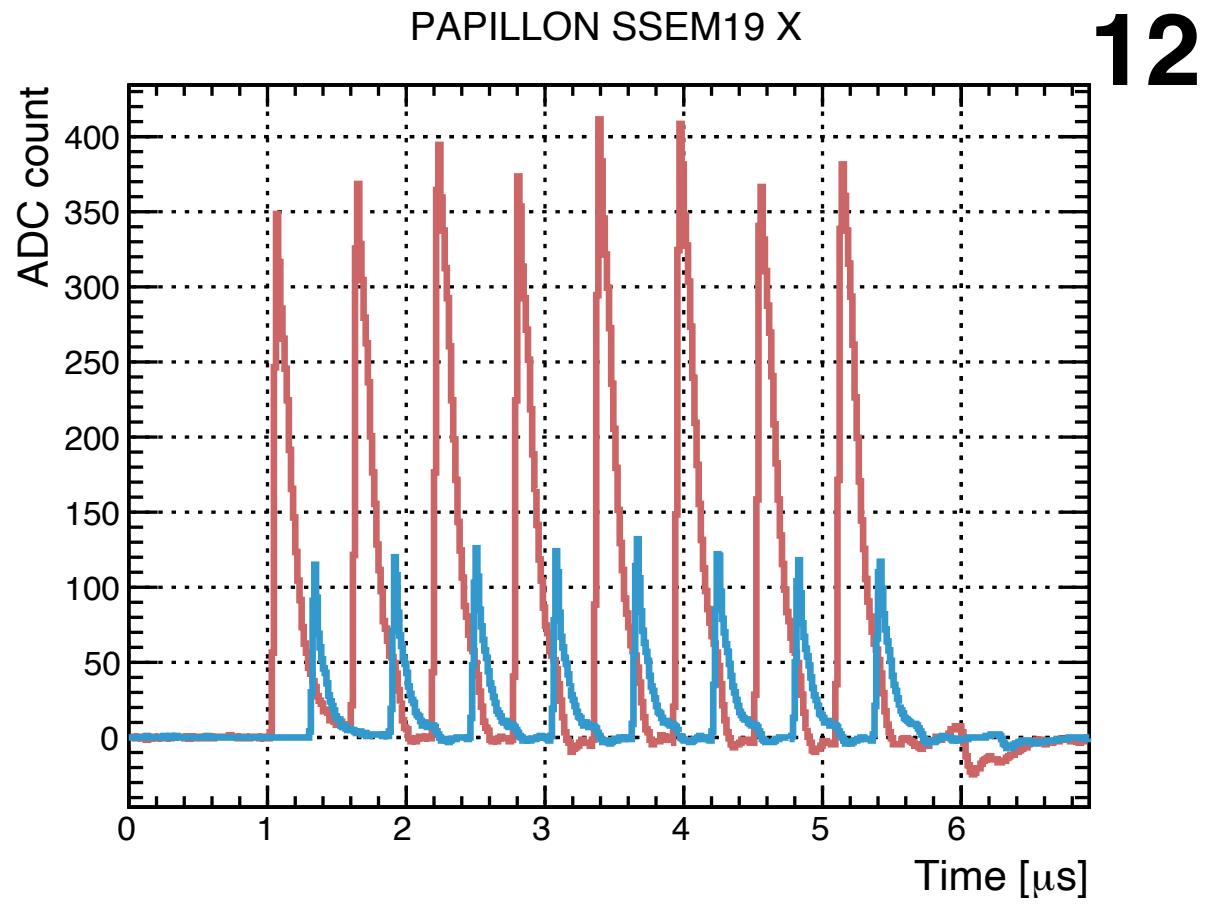
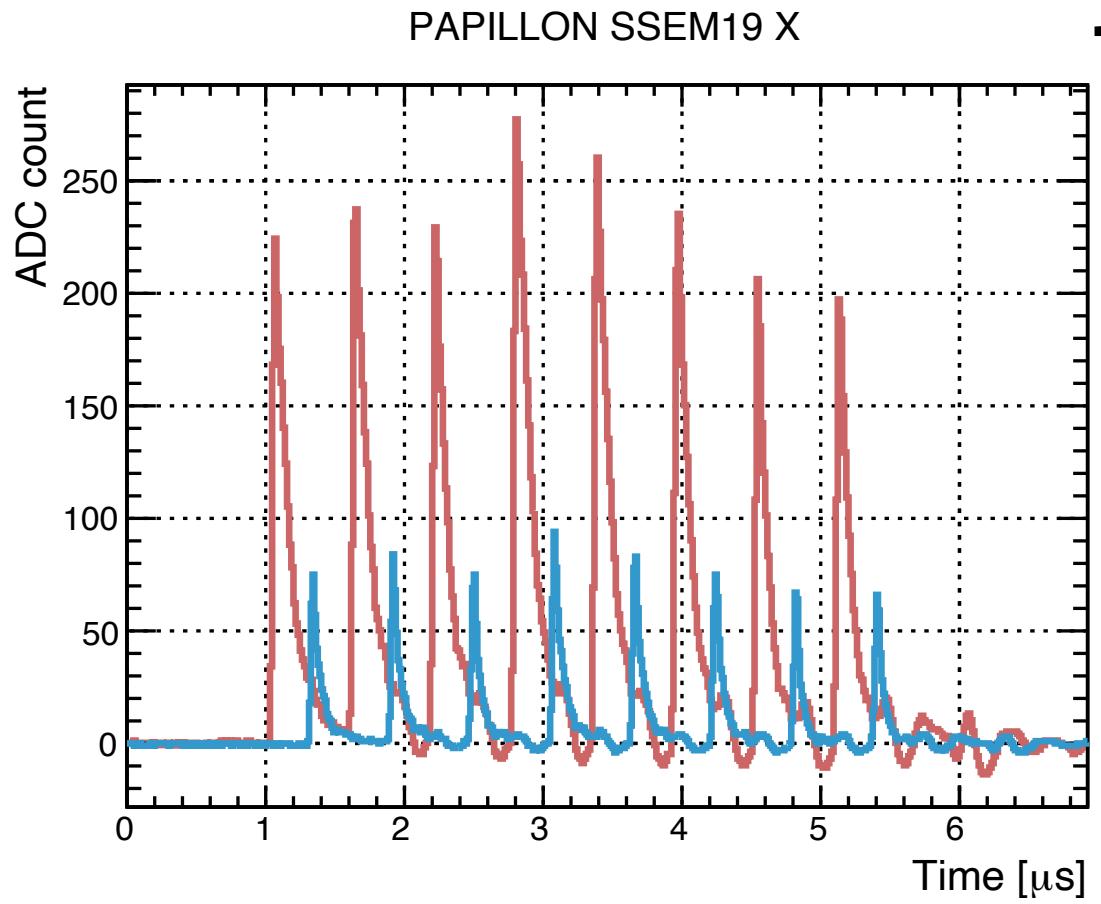


If the threshold is lowered from 1200 to 500 :

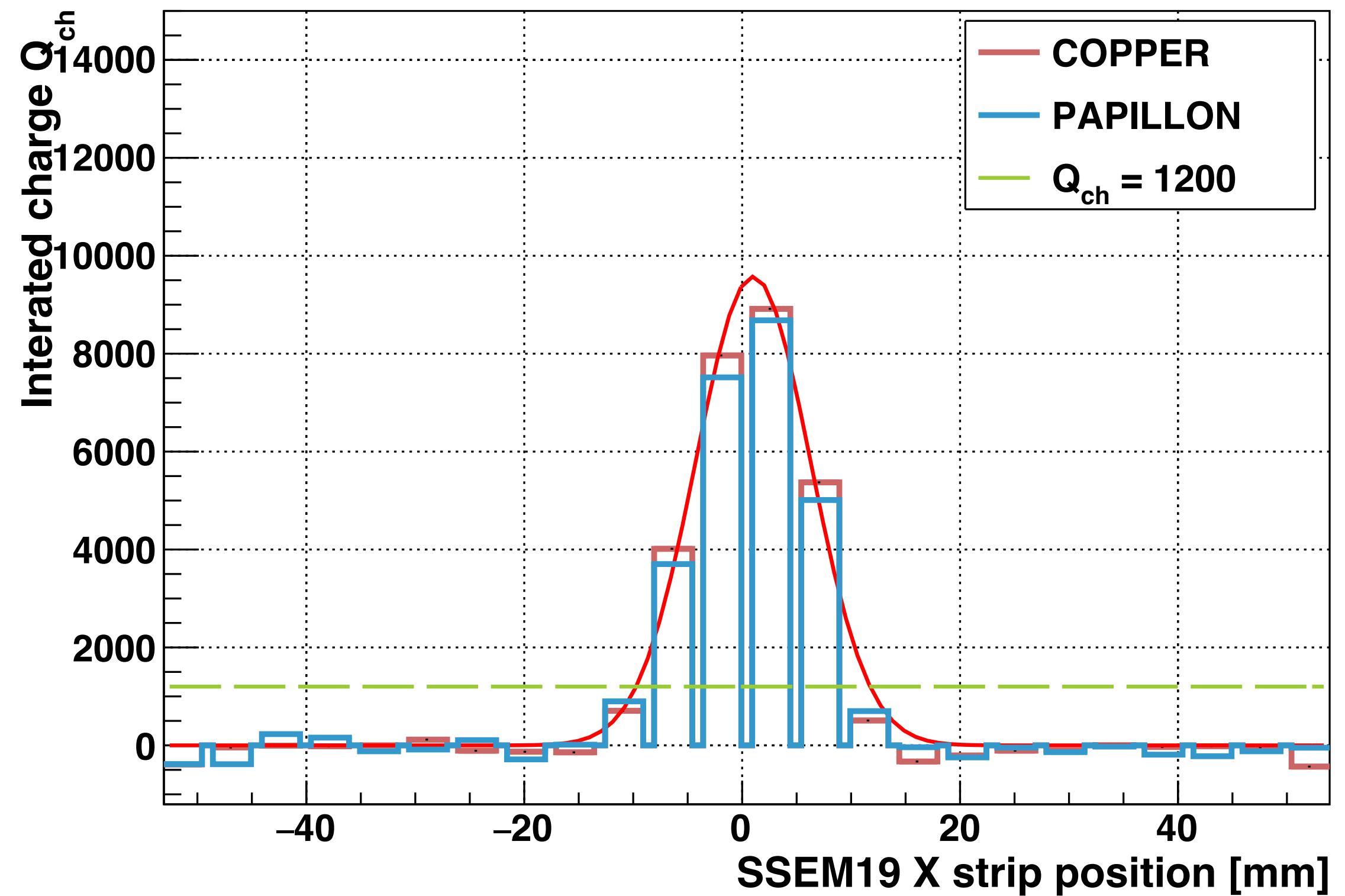
PAPILLON beam width: 5.05 mm (X), 4.14 mm (Y)
 Beam position is varied by ~0.1 mm ([backup](#))

Run910323 ev79
 (width scan)

Waveform Comparison



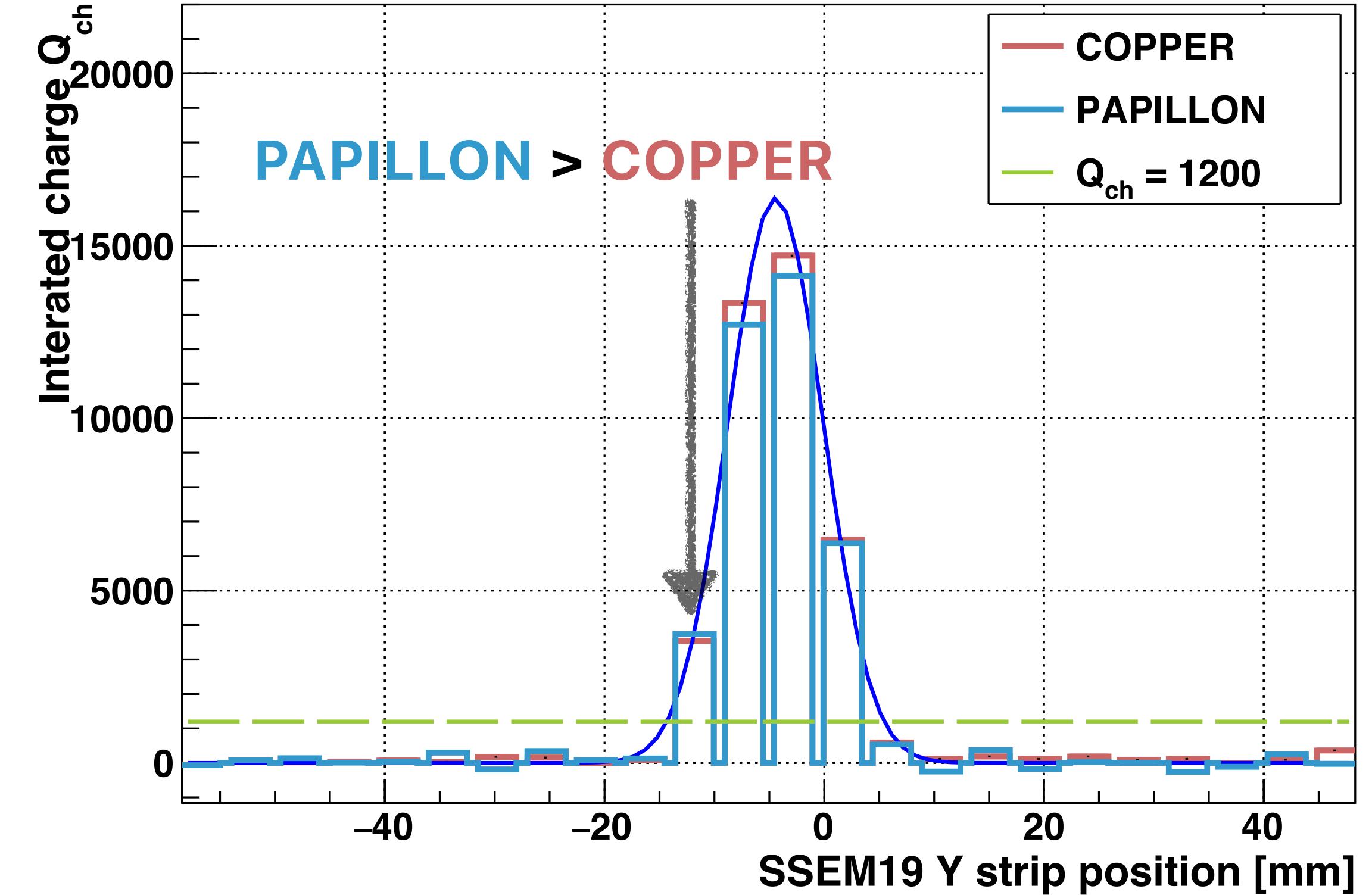
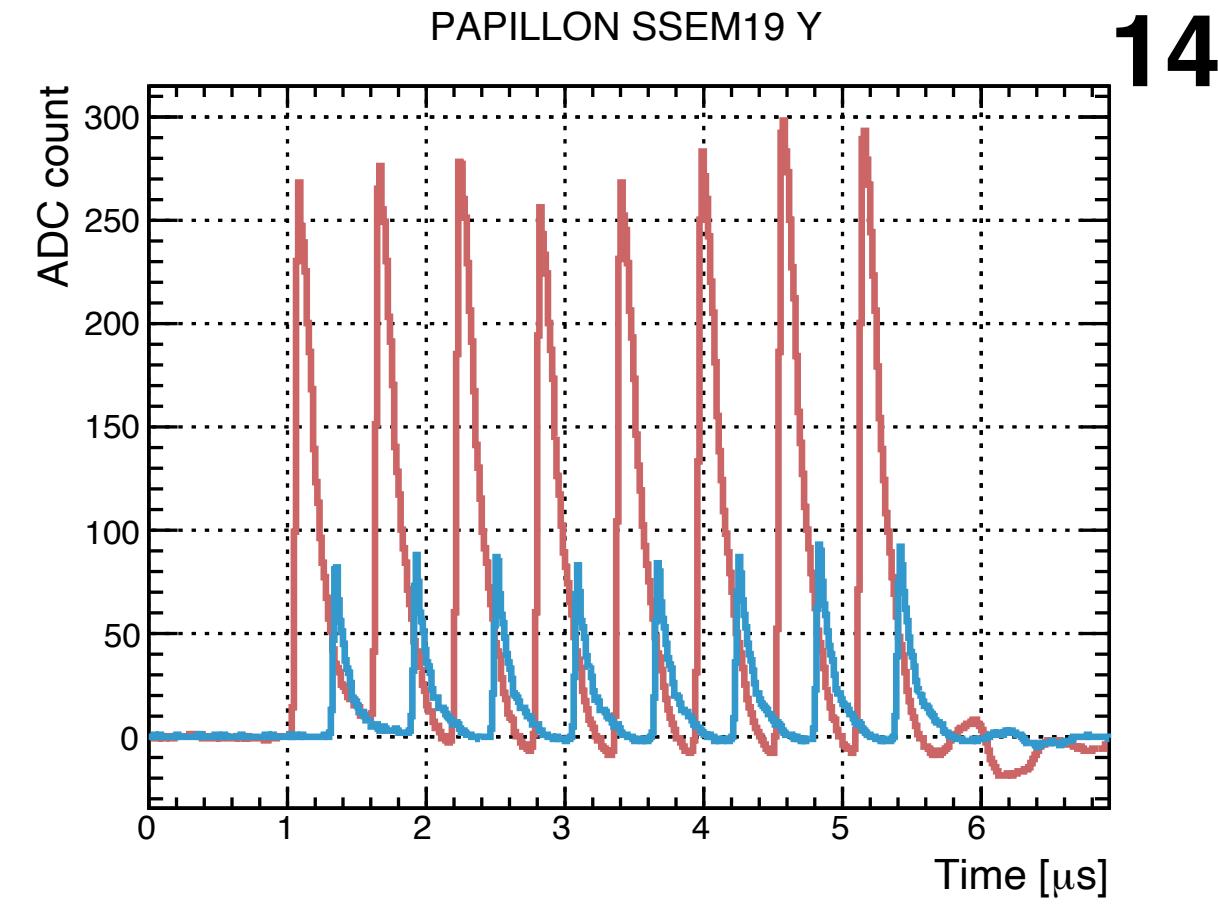
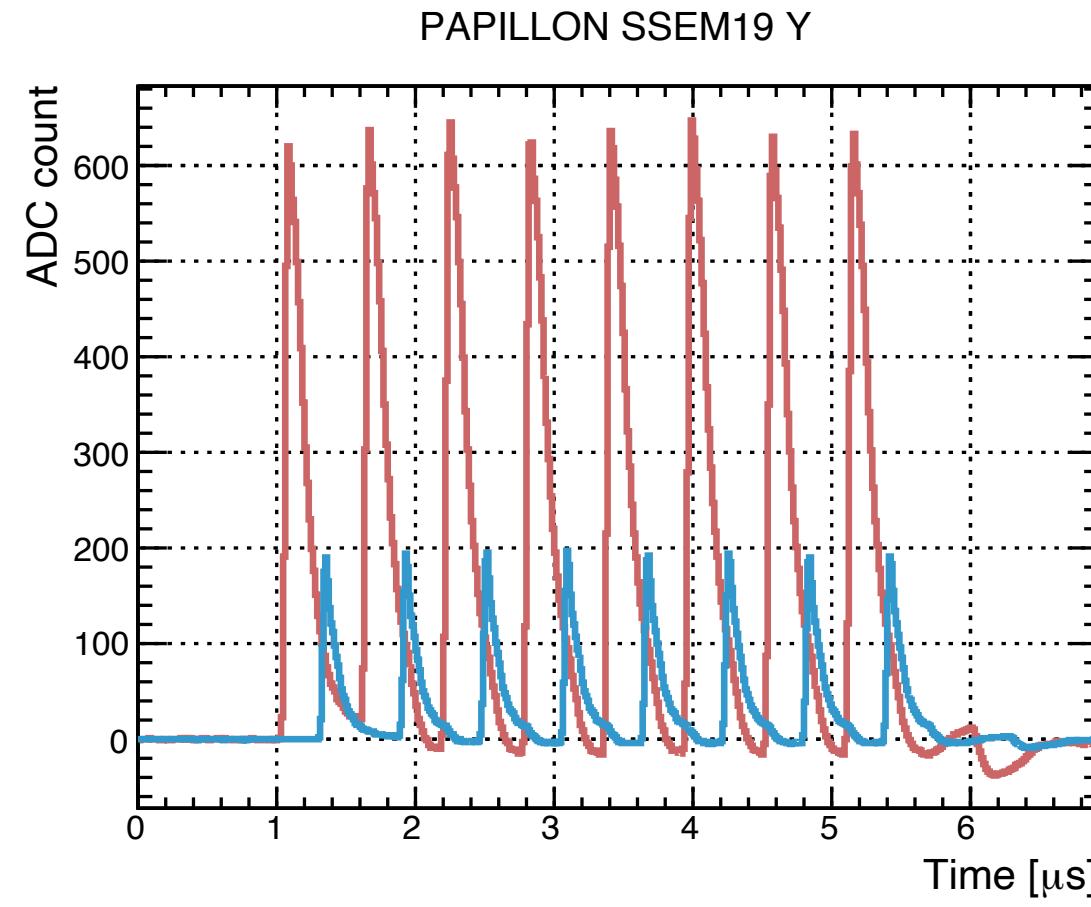
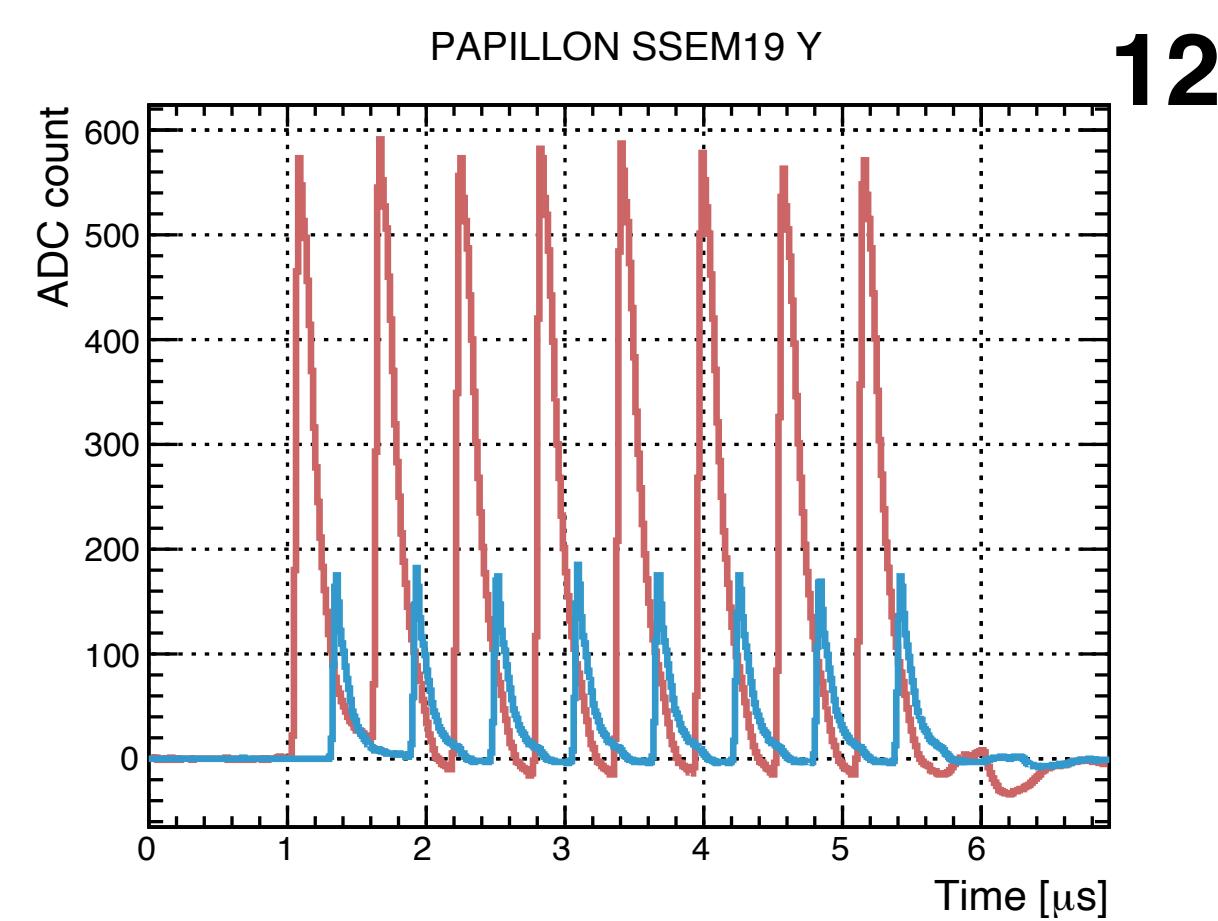
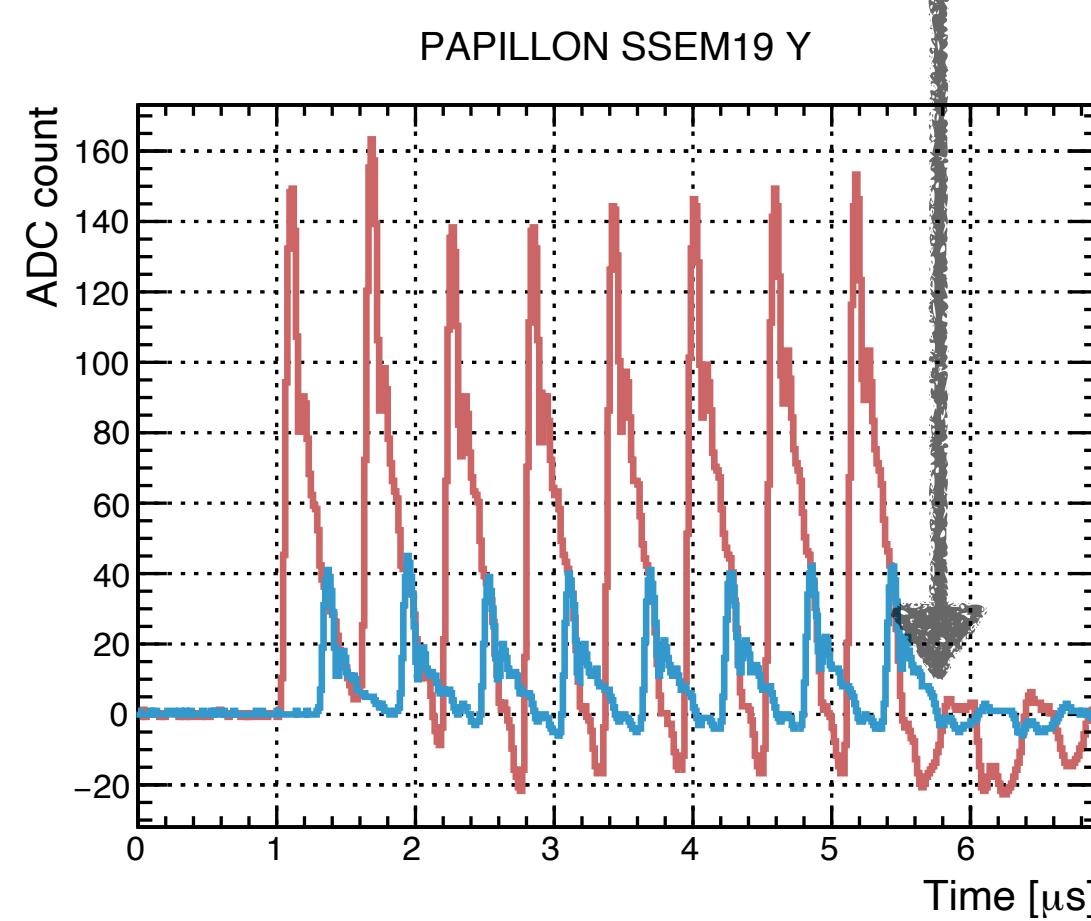
**Basically, the height of PAPILLON waveform is smaller than that of COPPER.
→ PAPILLON < COPPER**



NOTE) after pedestal subtraction

Waveform Comparison

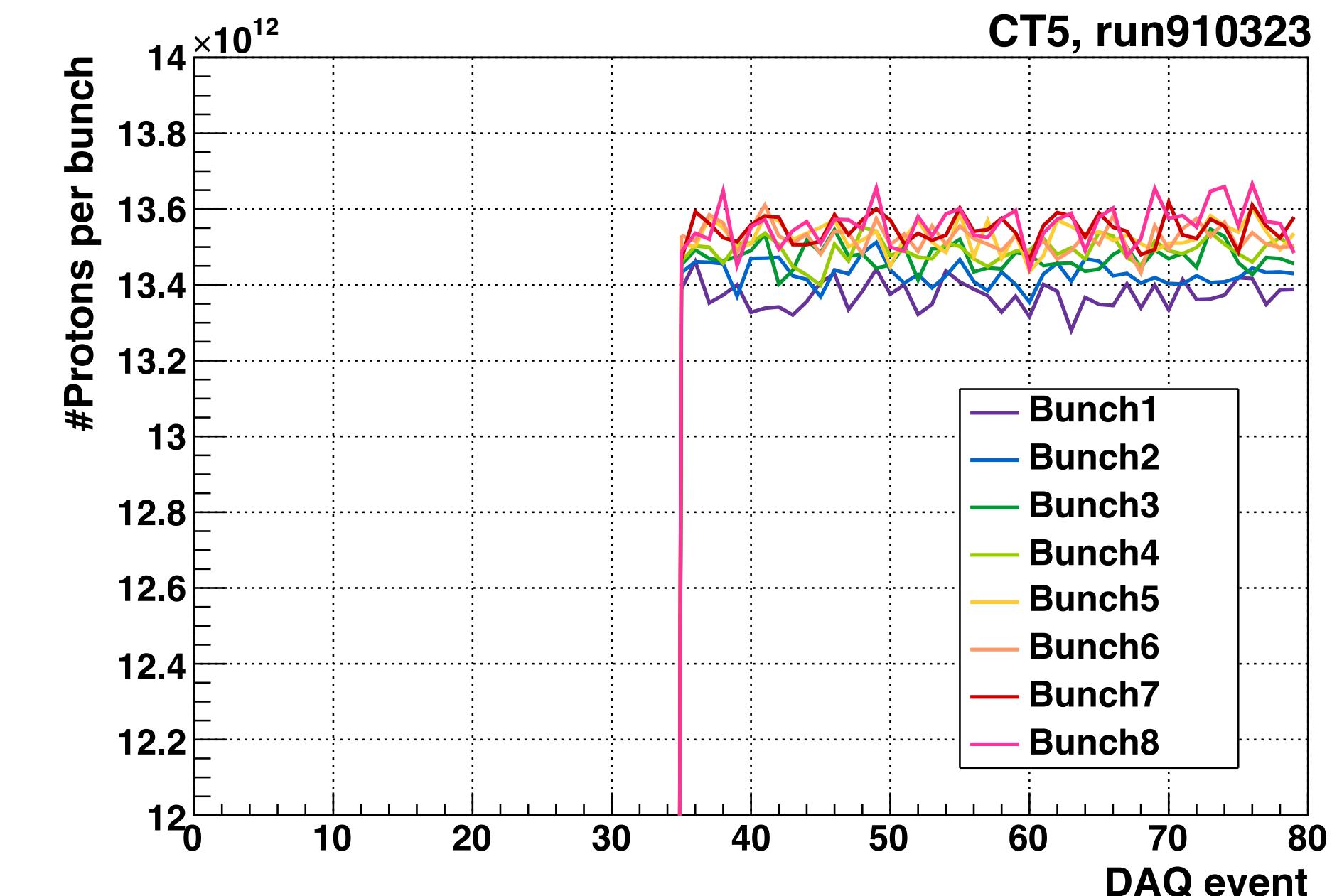
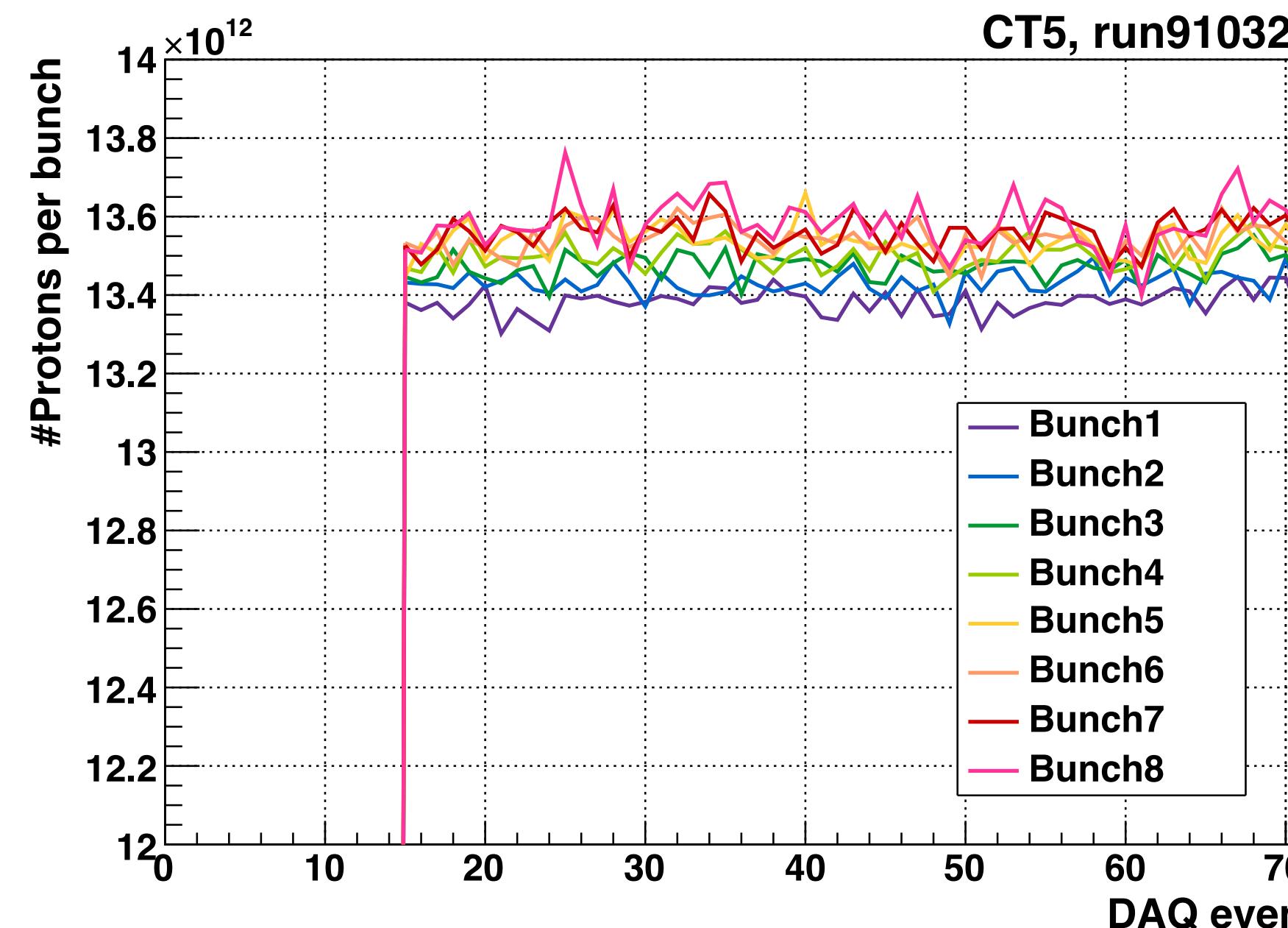
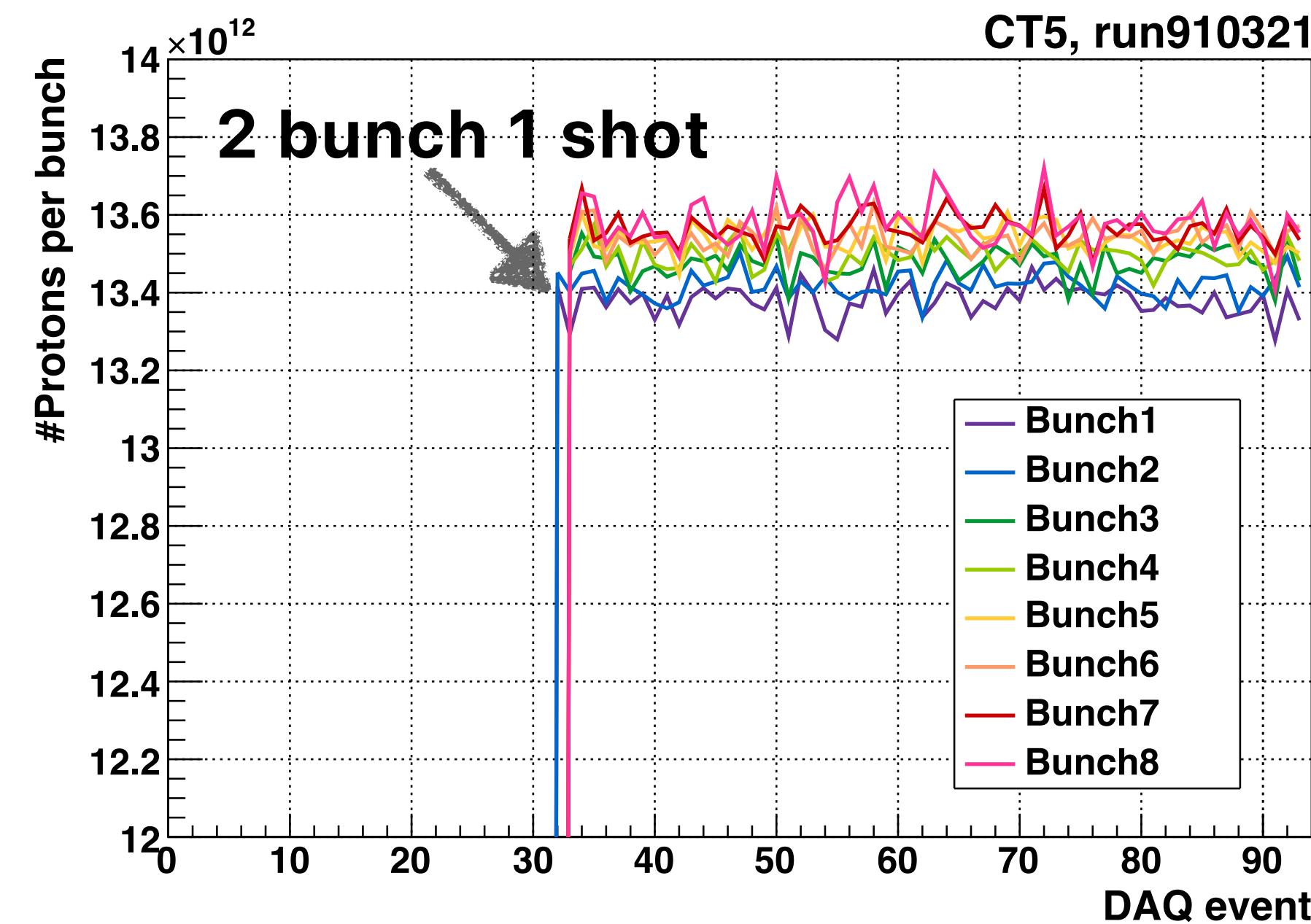
Large undershoot in COPPER
 → **PAPILLON > COPPER**



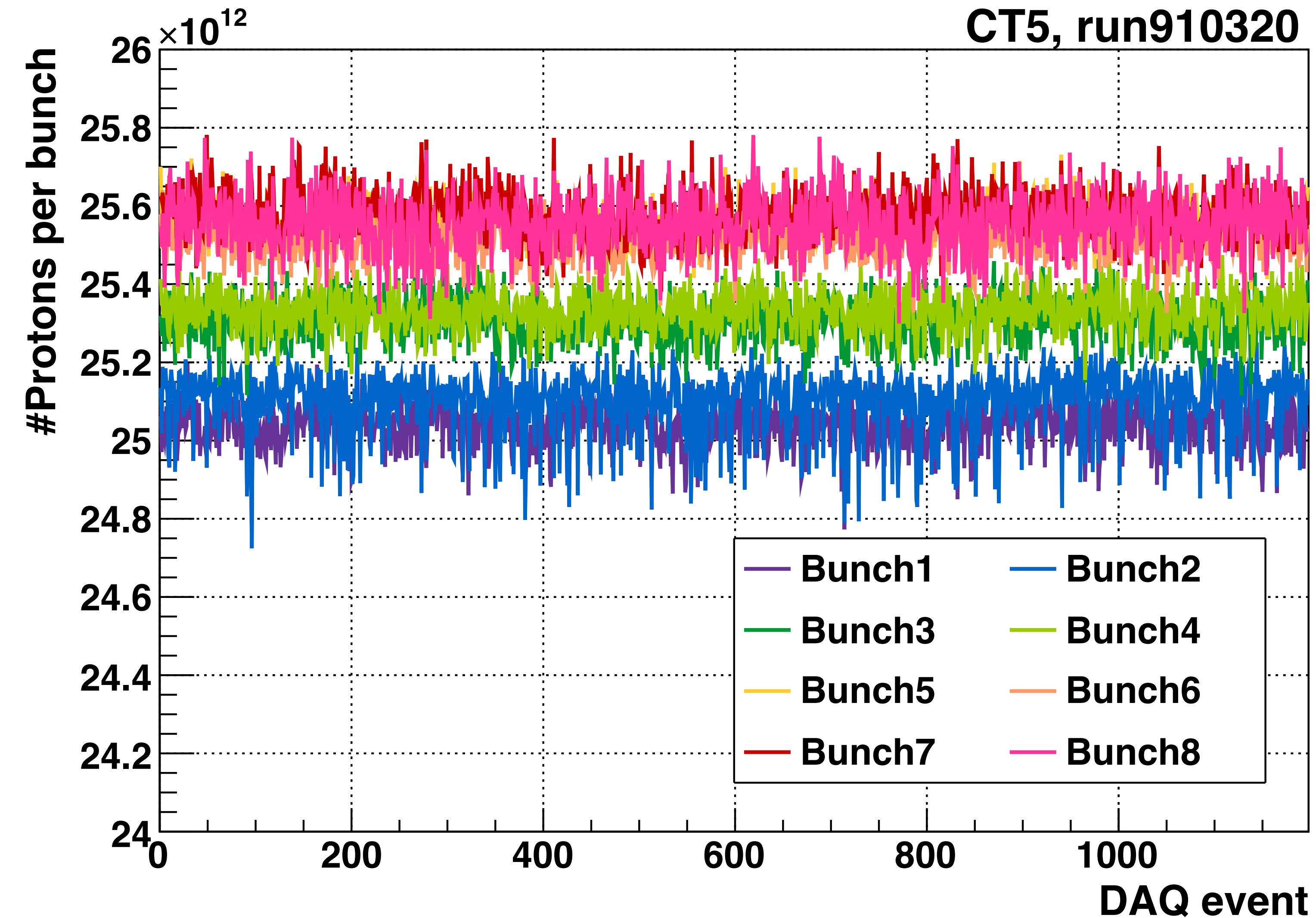
NOTE) after pedestal subtraction

PPB during Beam Test

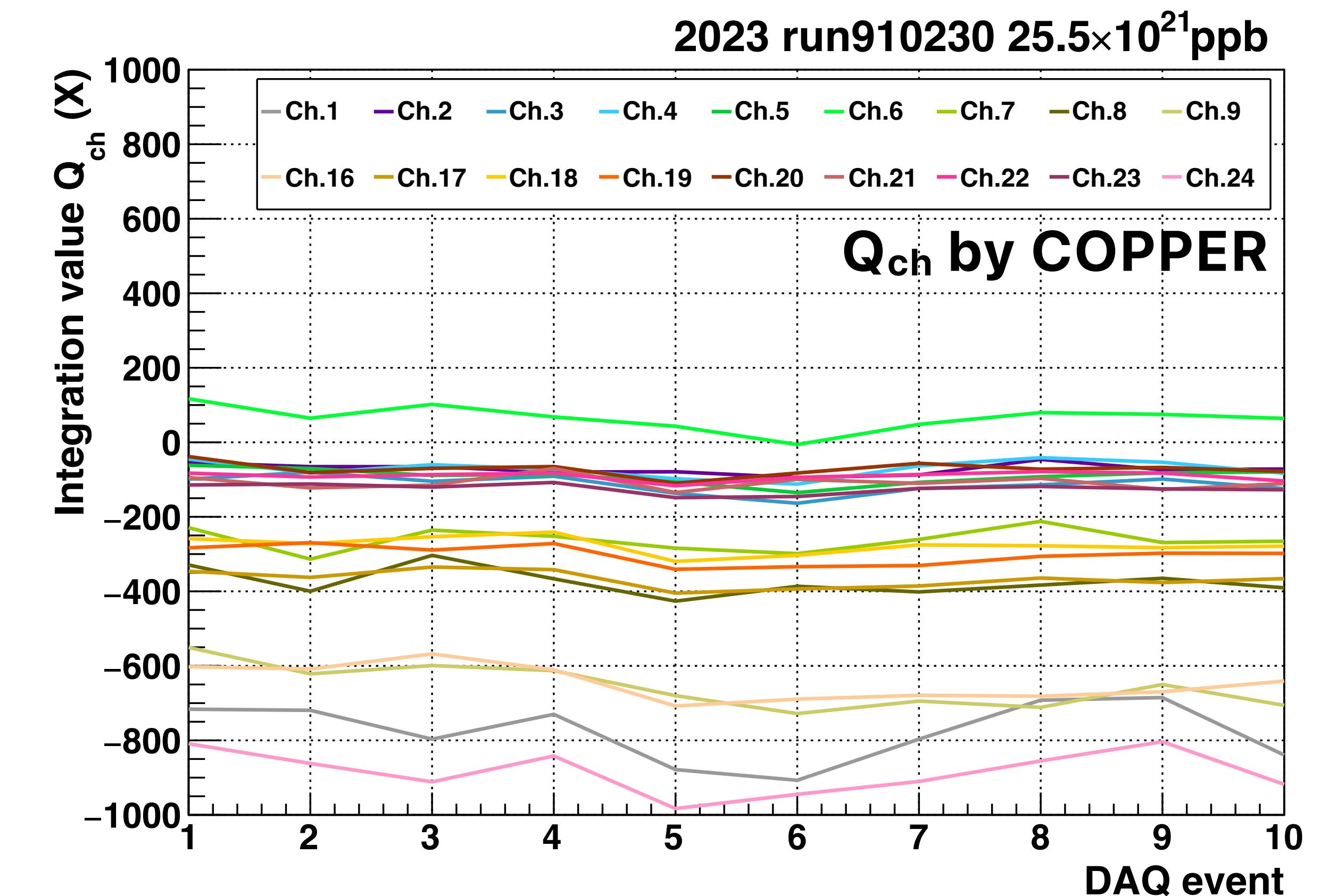
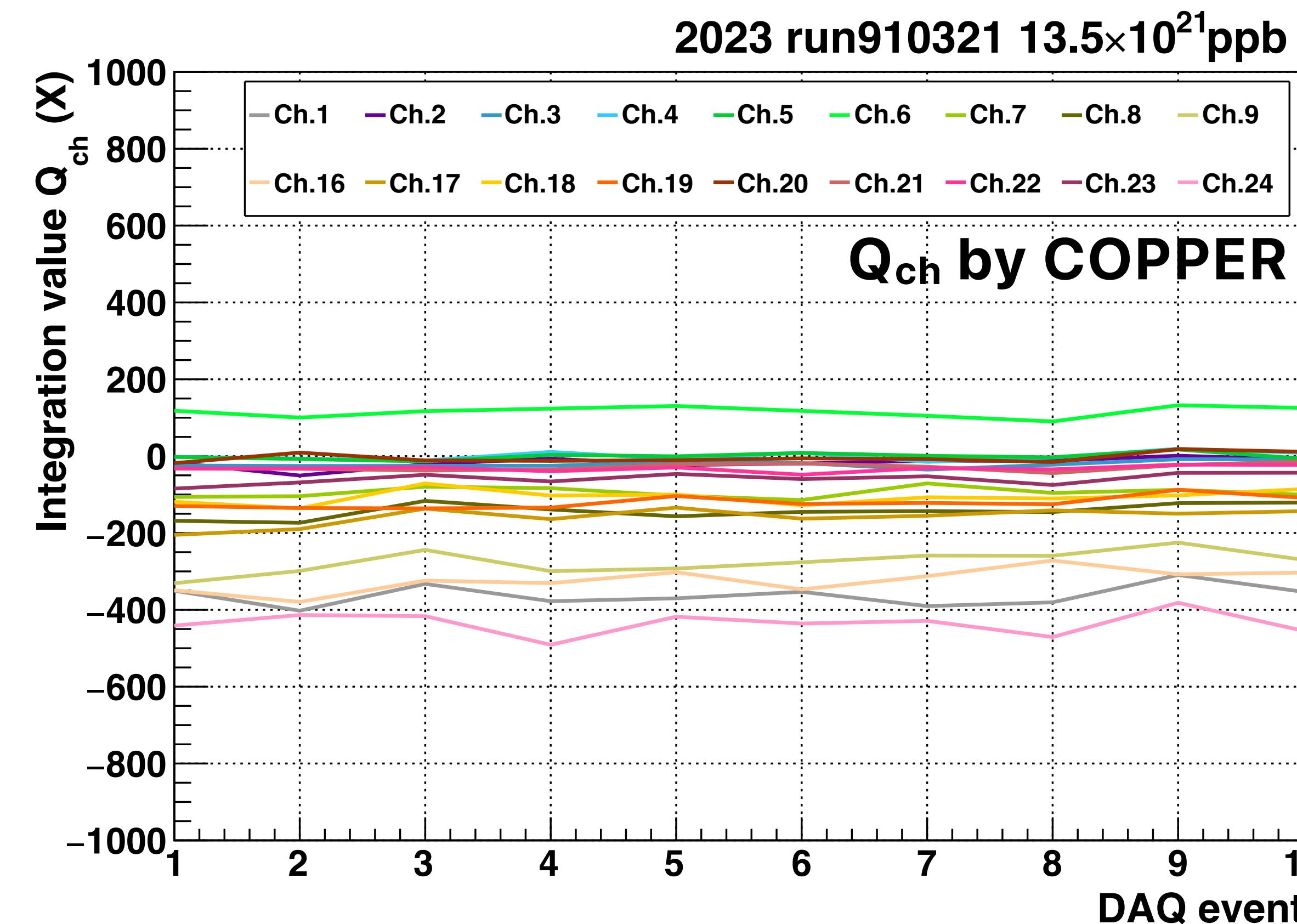
13.5×10^{12} ppb during the beam test.



Reference Run for Q_{ch} Comparison

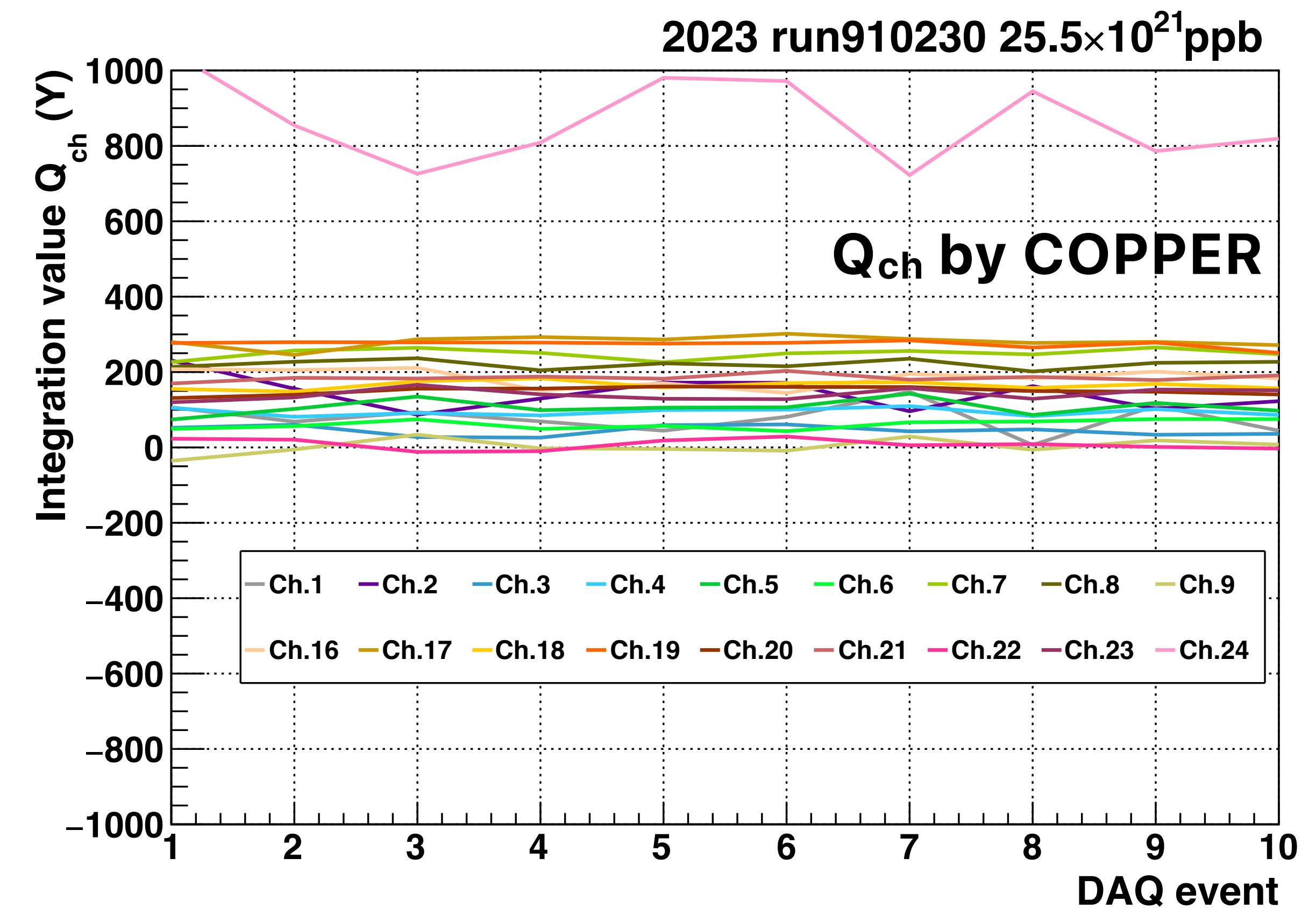
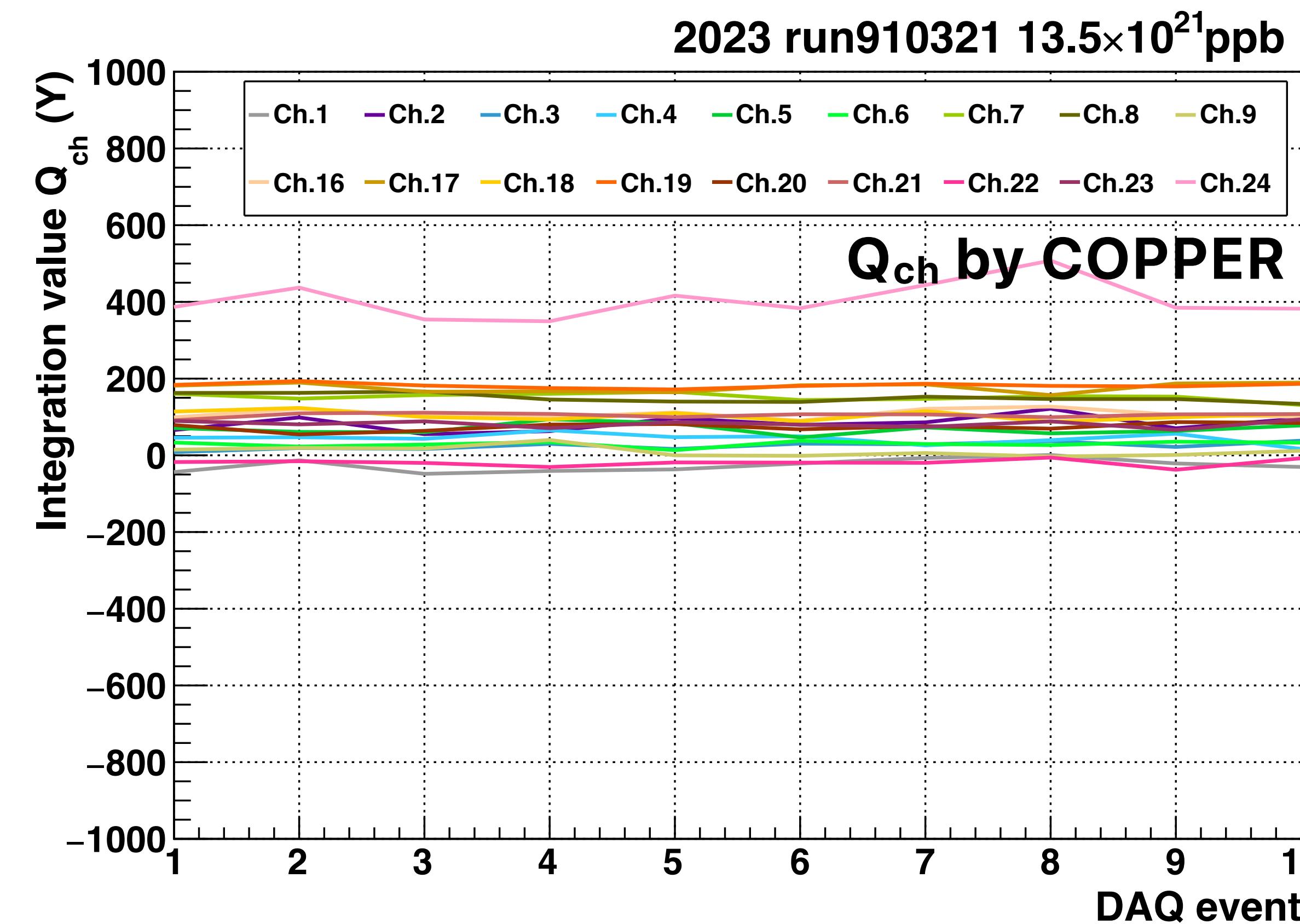


Contribution of Edge Strips (X)



Upper level of Q_{ch} @edge strip does not change even at ~ 2 times ppb.
 → We may change the threshold e.g. $1200 \rightarrow 500$.

Contribution of Edge Strips (Y)



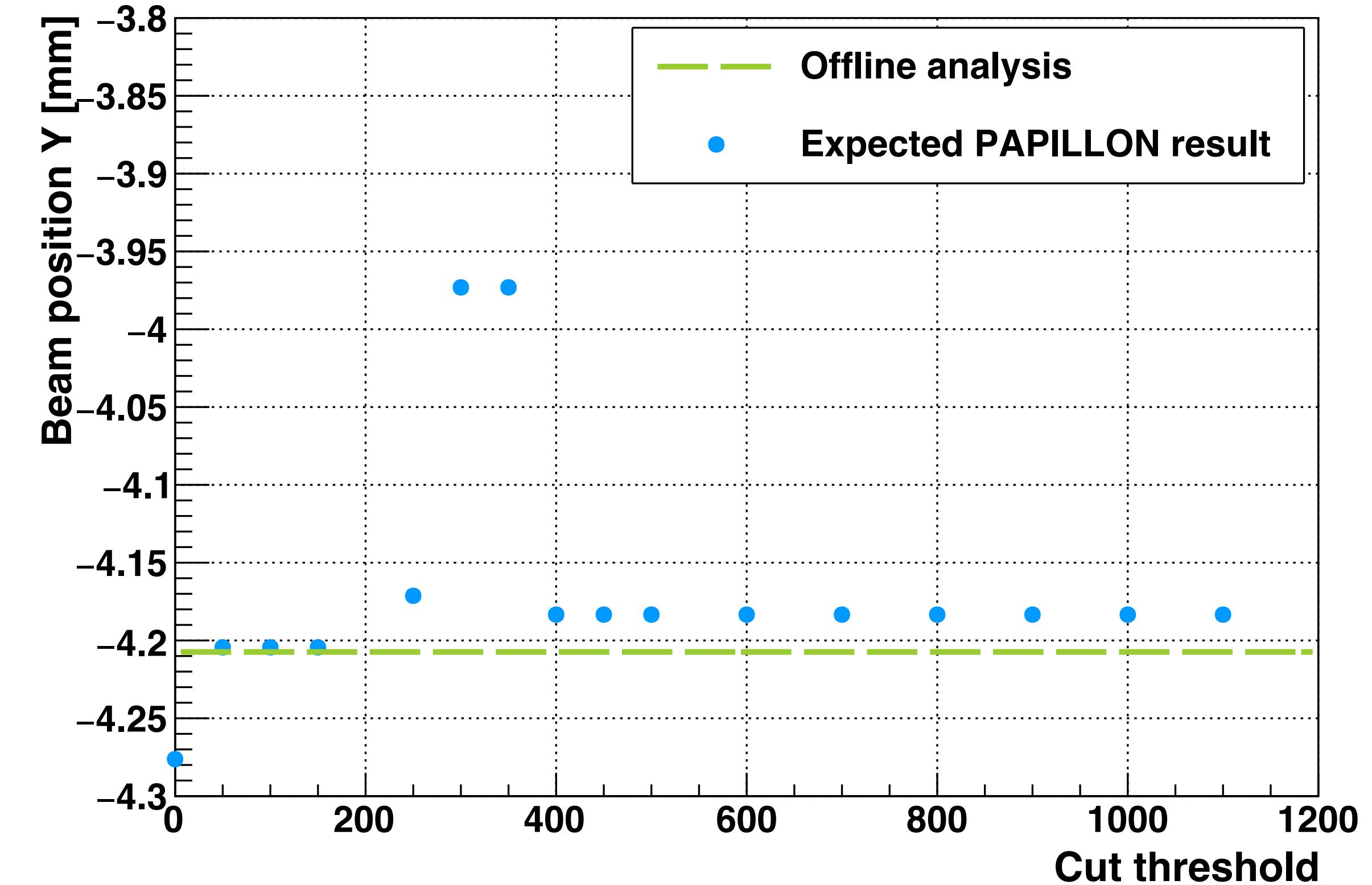
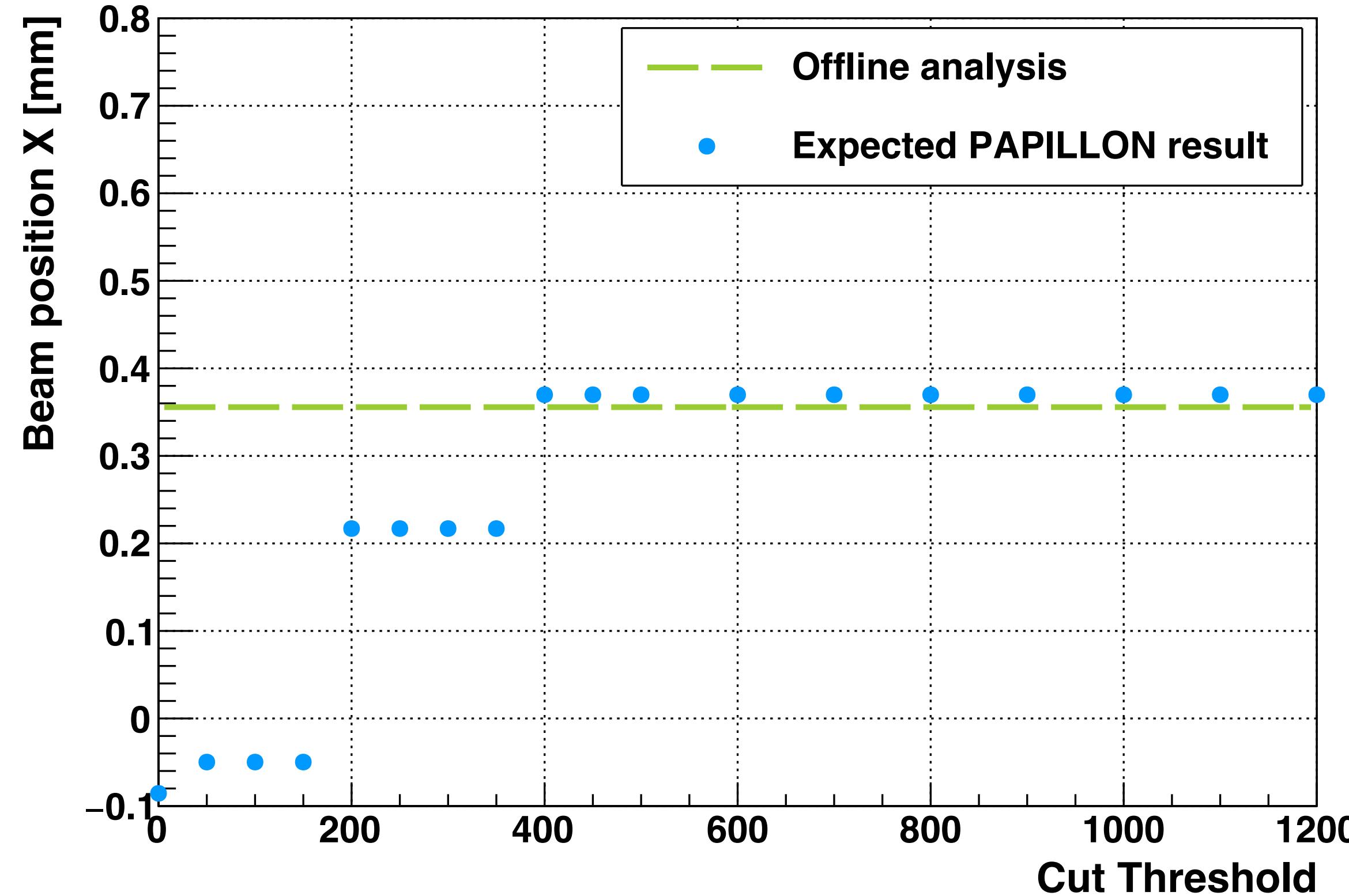
Upper level of Q_{ch} @edge strip slightly high by ~2 times large ppb.
 → We may still change the threshold e.g. $1200 \rightarrow 500$.



Backup

Beam Position under Different Q_{ch} Cut

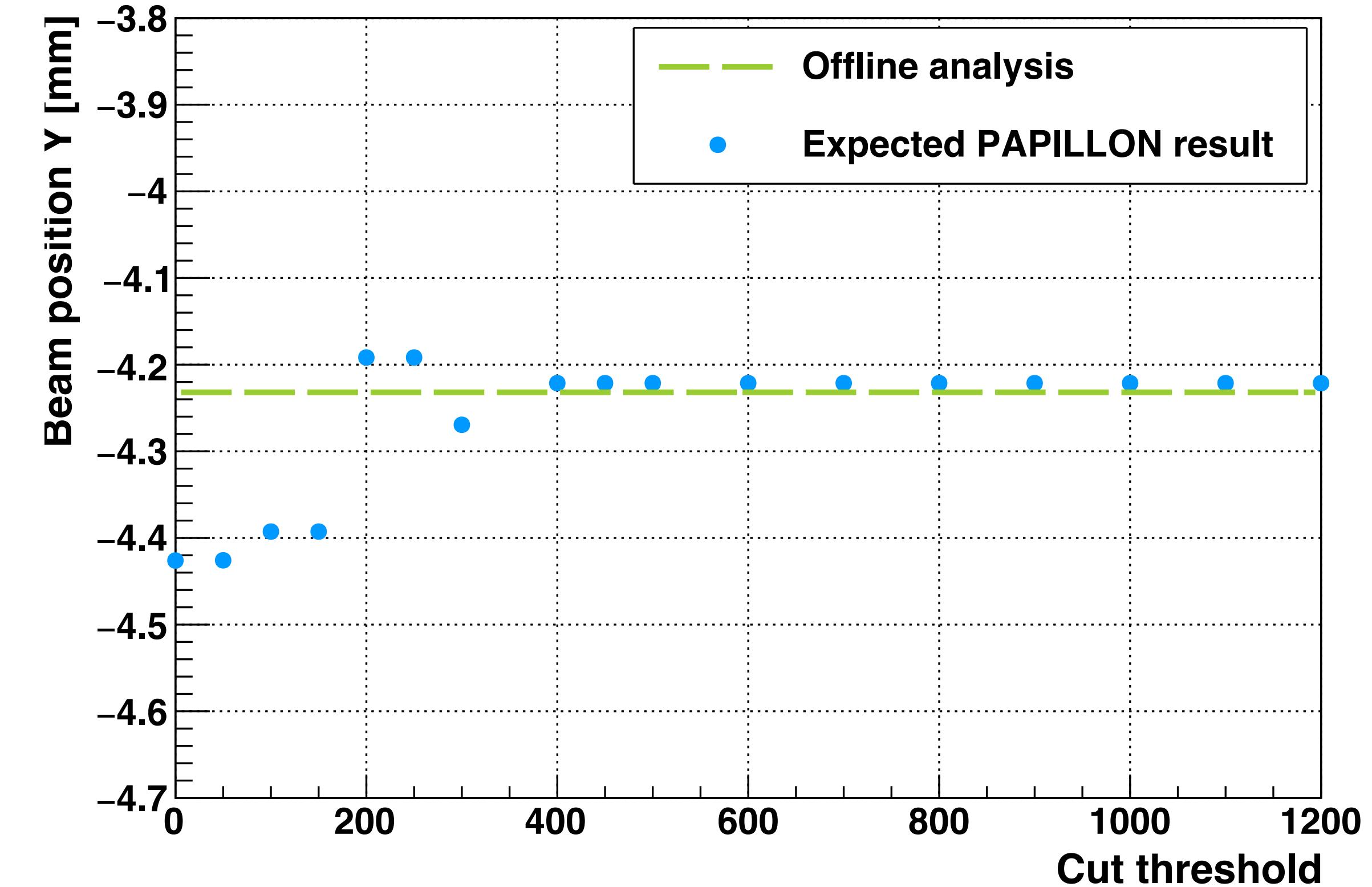
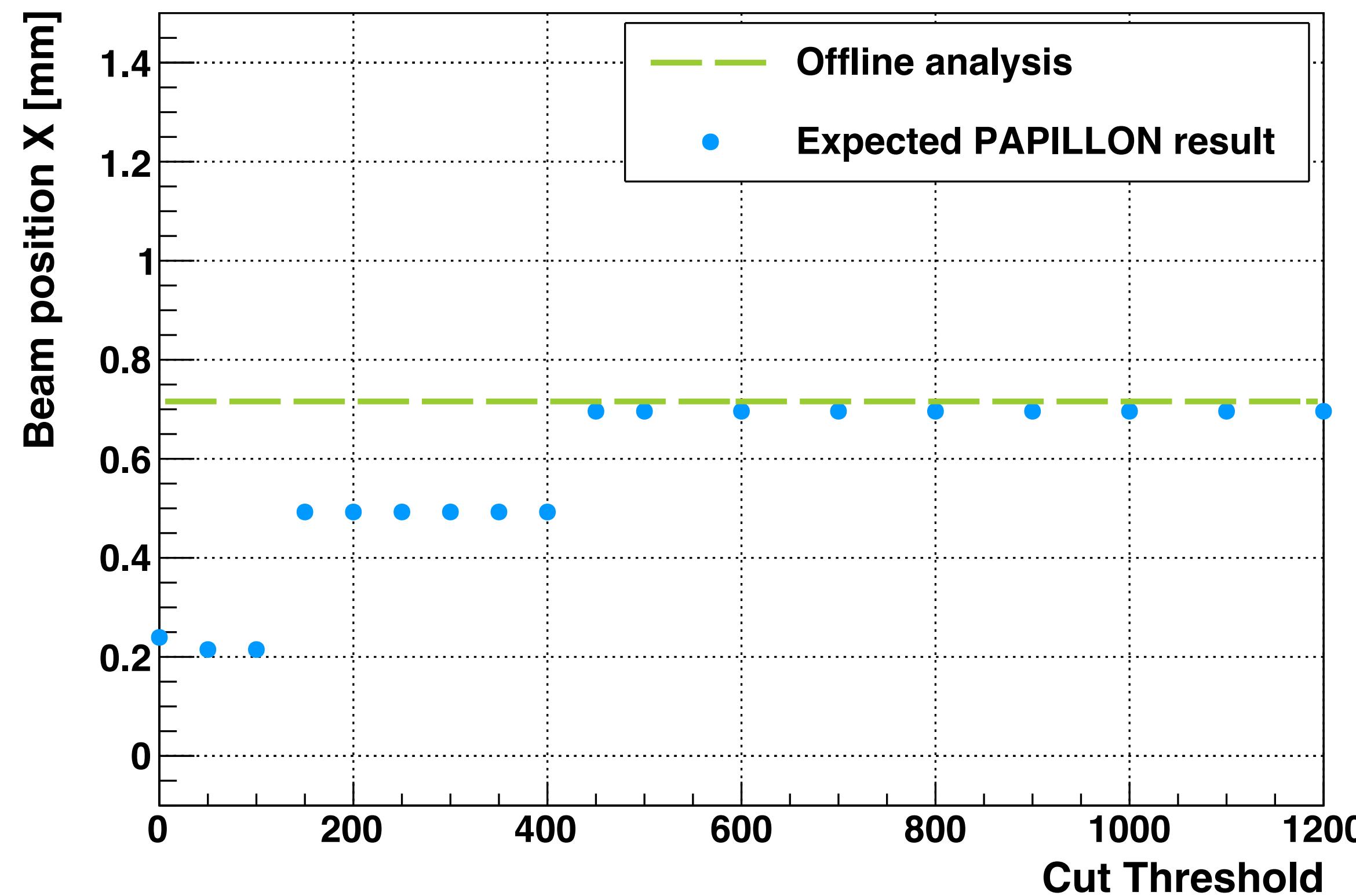
Run910321 ev47
(X position scan, nominal)



Results of threshold = 400 - 1200 are same.

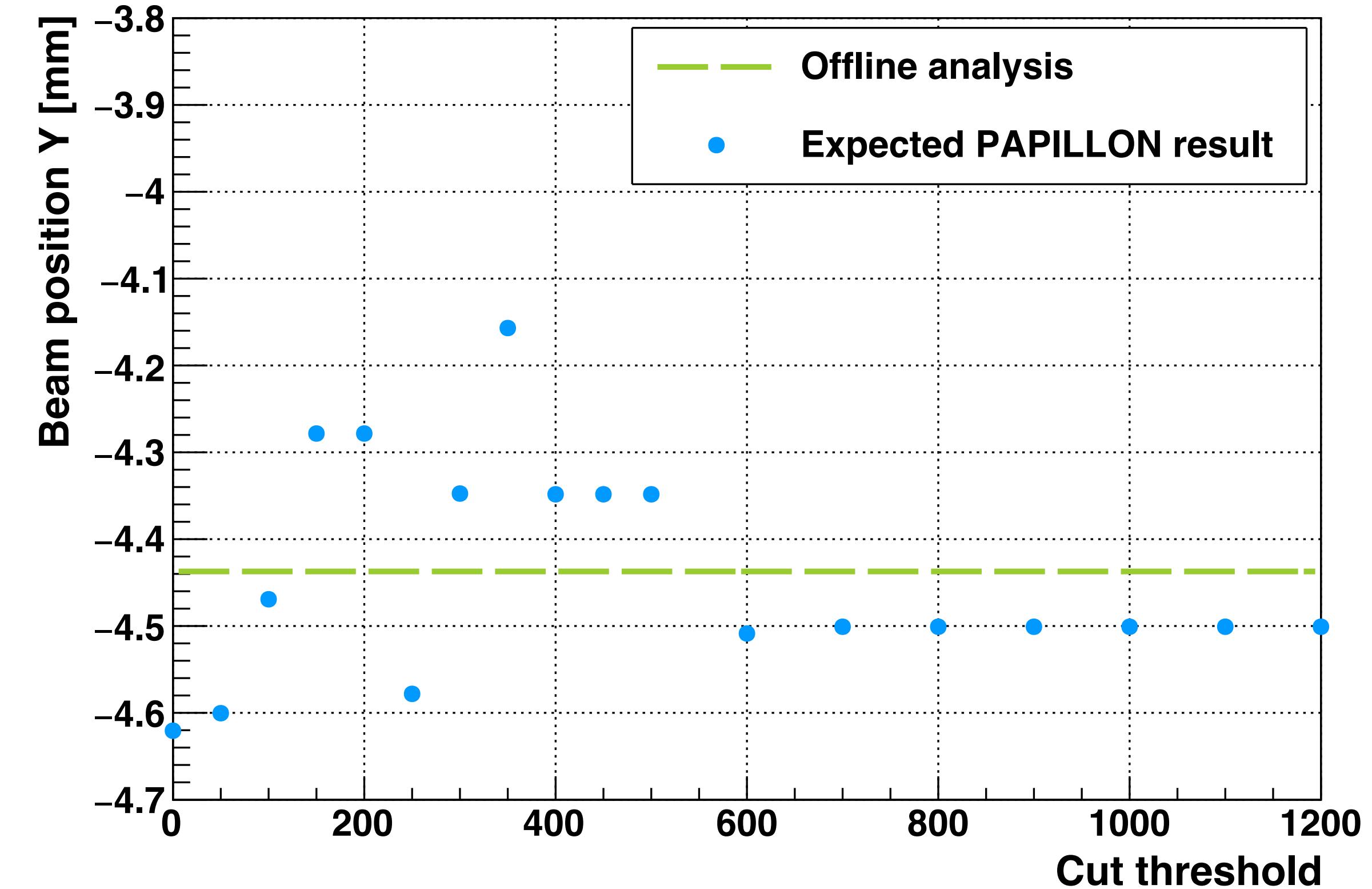
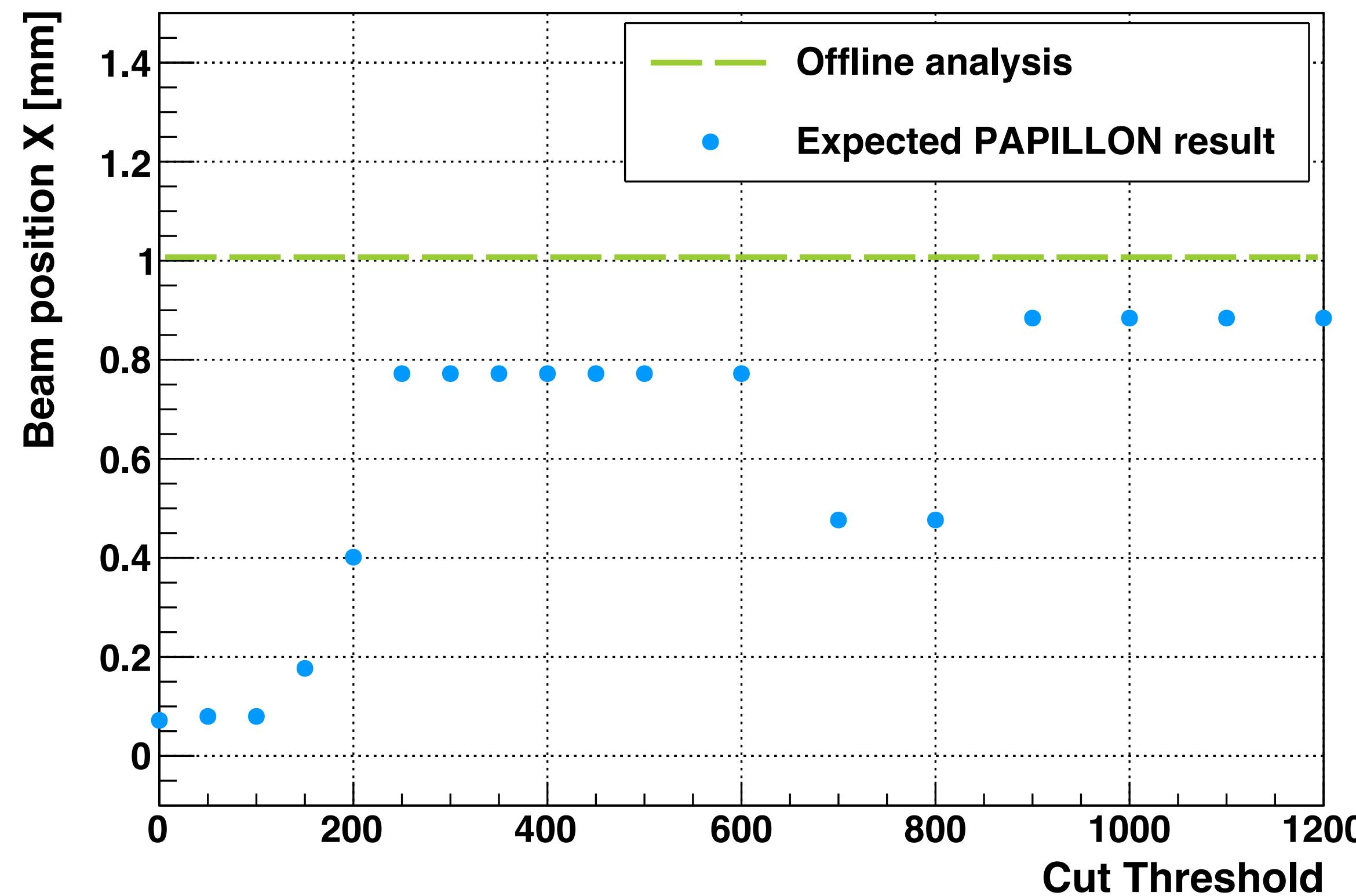
Beam Position under Different Q_{ch} Cut

Run910321 ev93
(X position scan, +1.0 mm)



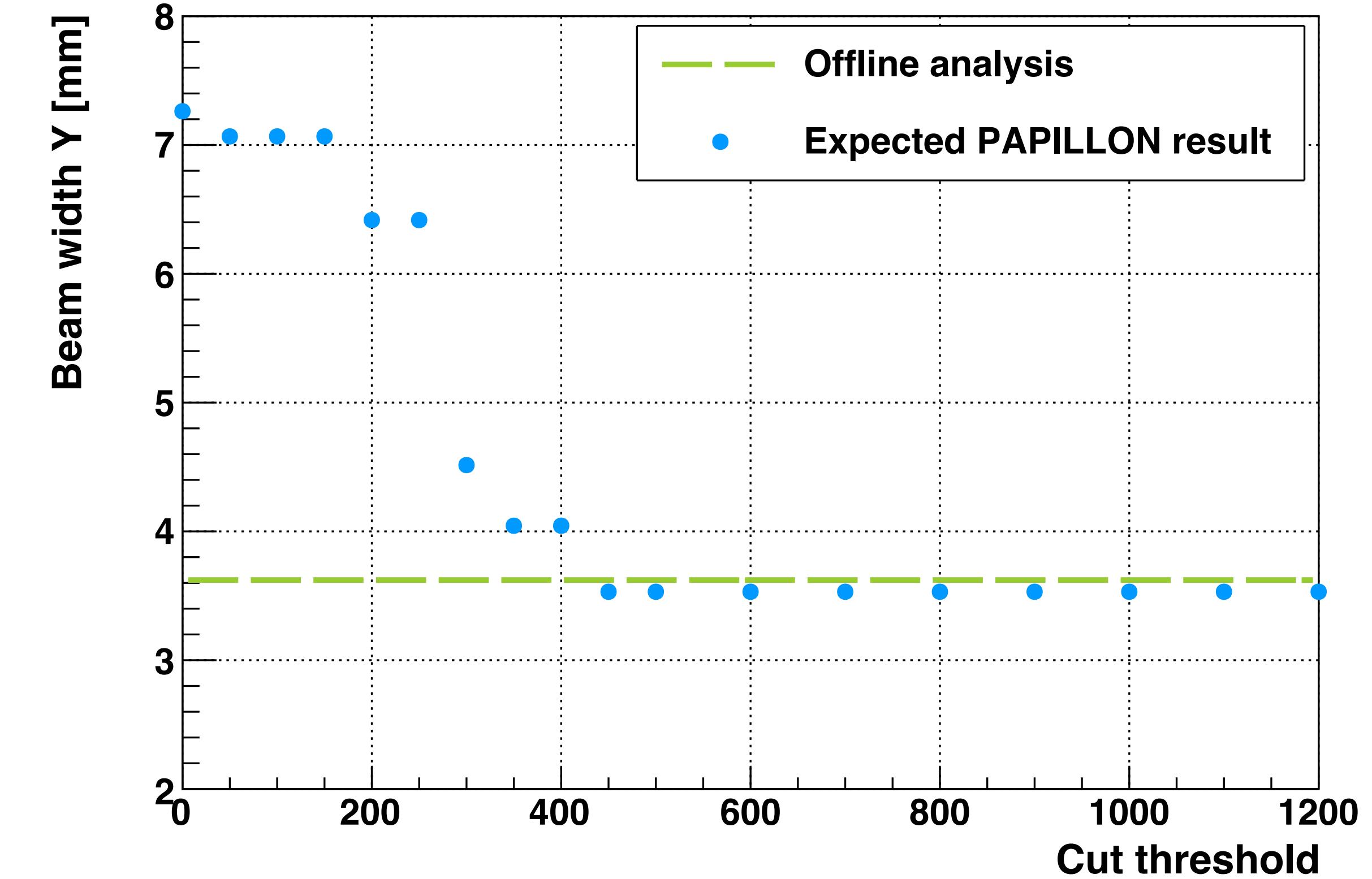
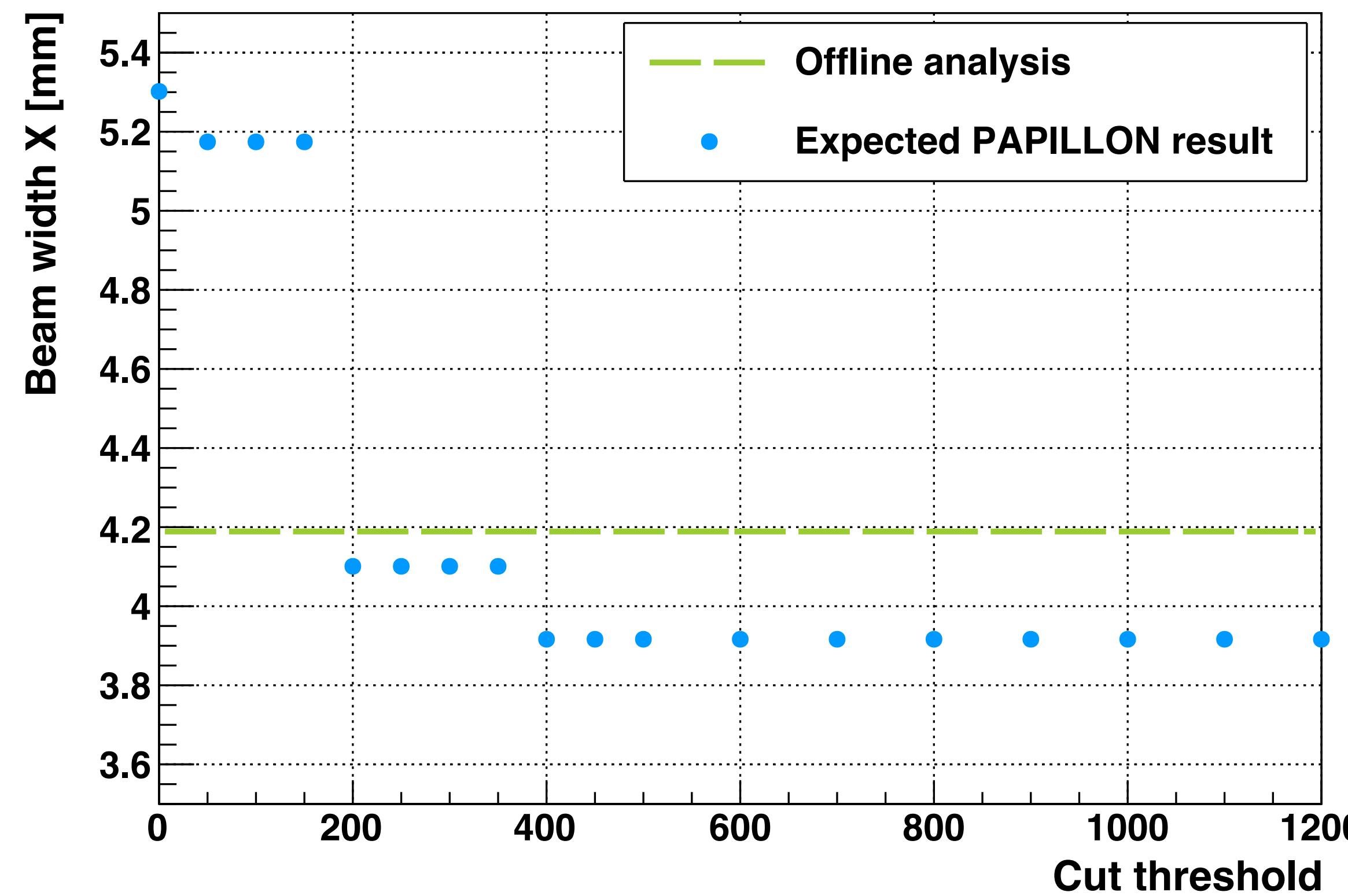
Beam Position under Different Q_{ch} Cut

Run910323 ev79
(Width scan, +0.6 mm)



Beam Width under Different Q_{ch} Cut

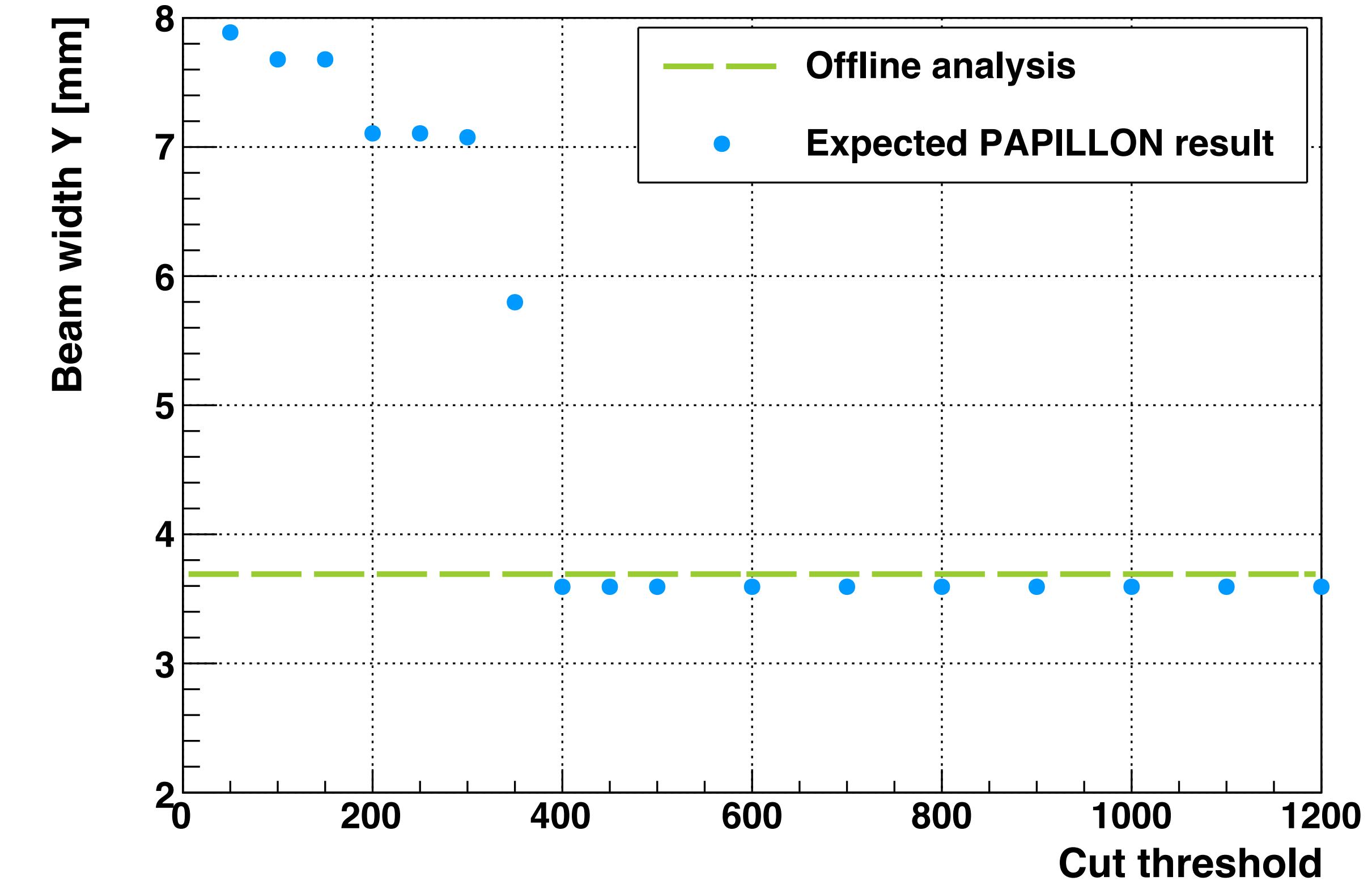
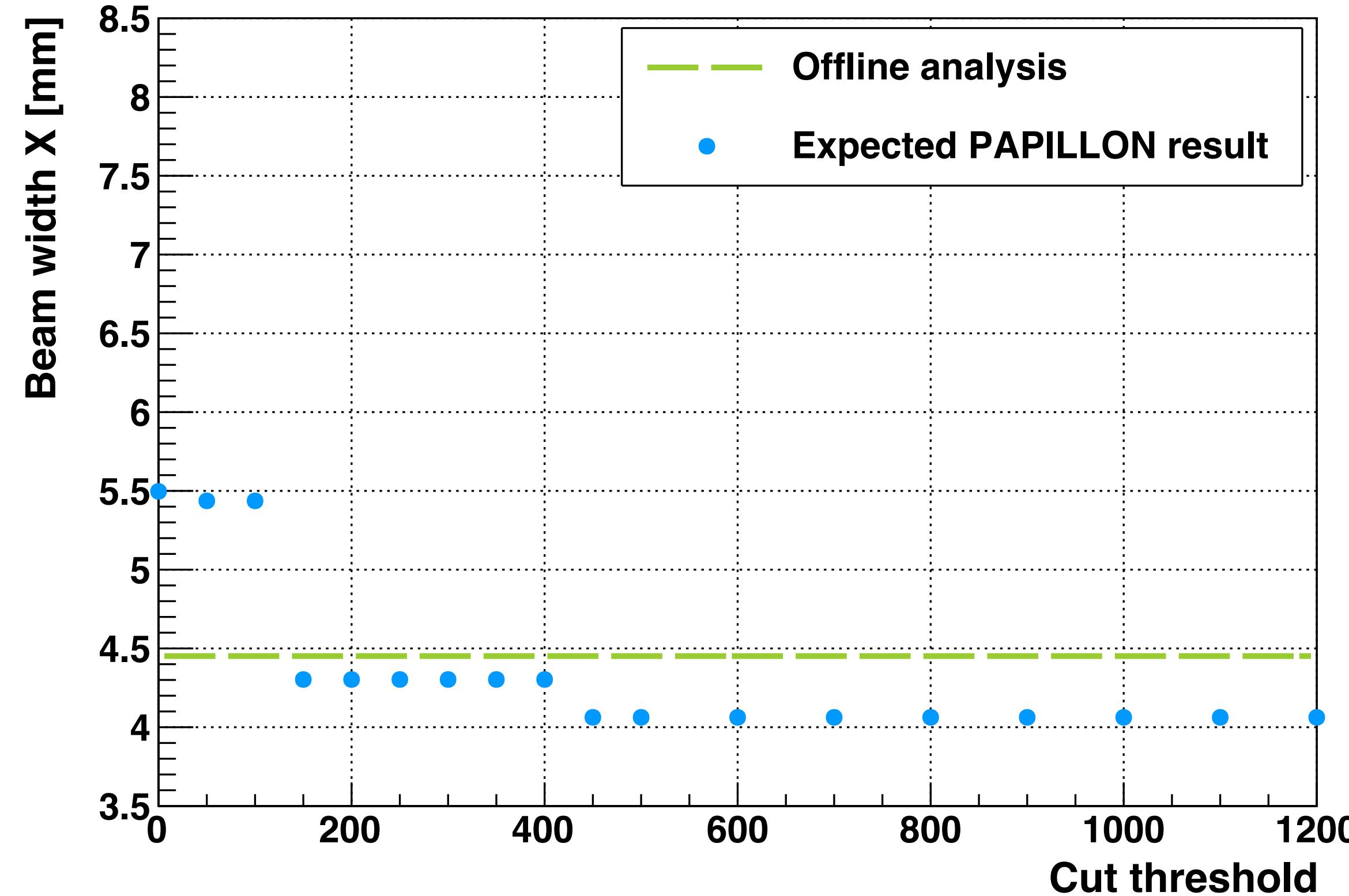
Run910321 ev47
(X position scan, nominal)



Results of threshold = 400 - 1200 are same.

Beam Width under Different Q_{ch} Cut

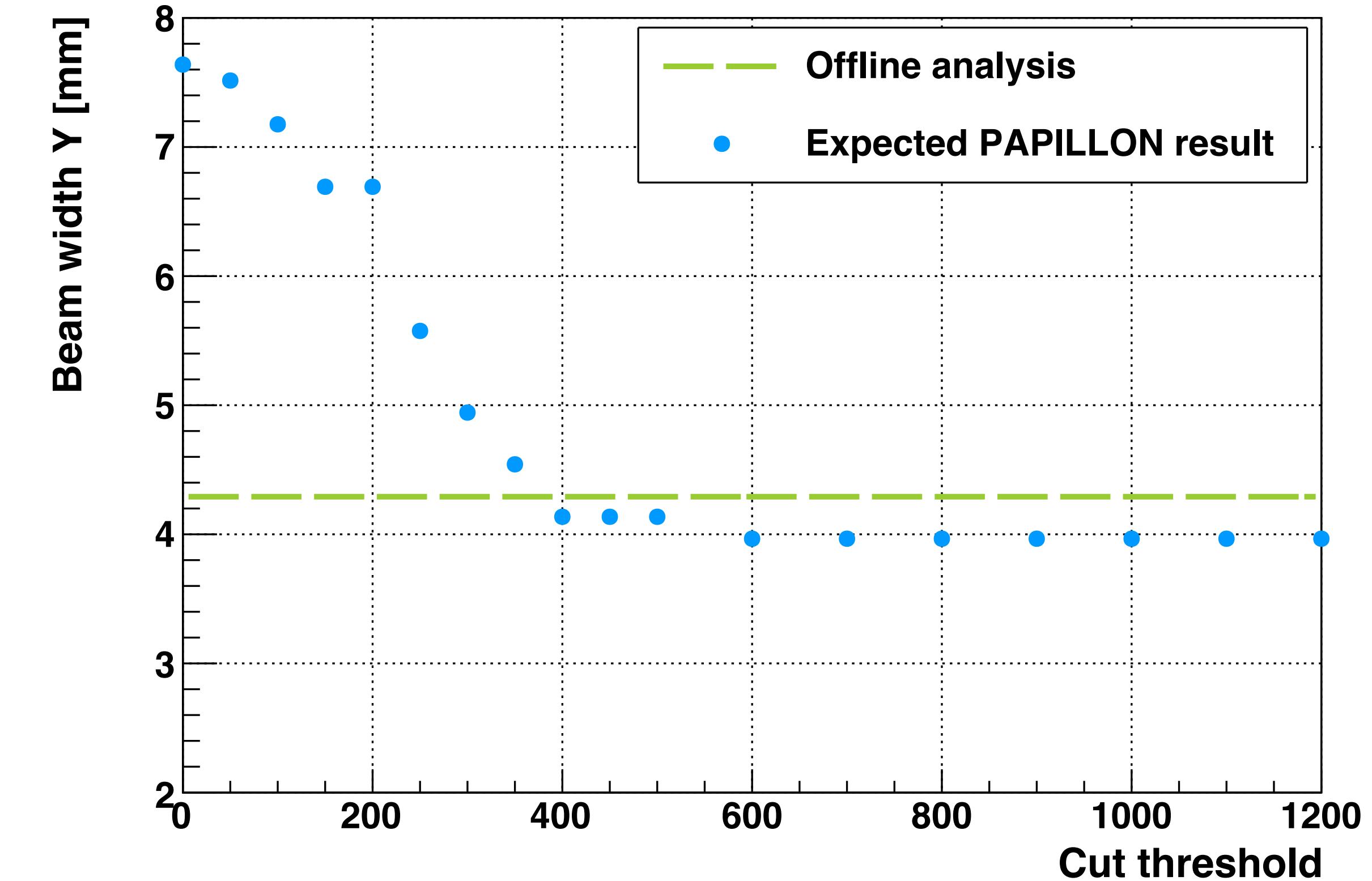
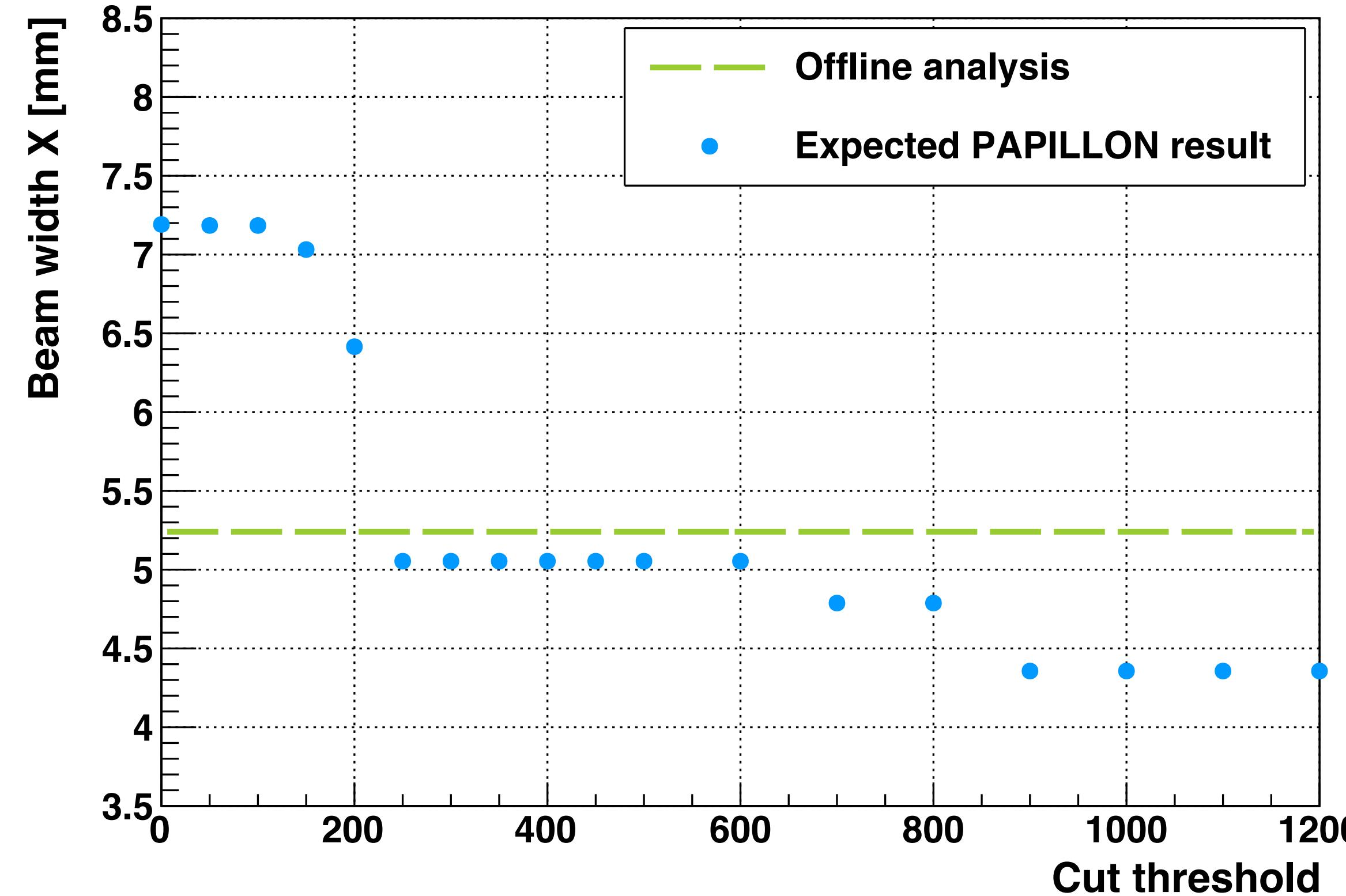
Run910321 ev93
(X position scan, +1.0 mm)



Results of threshold = 400 - 1200 are same.

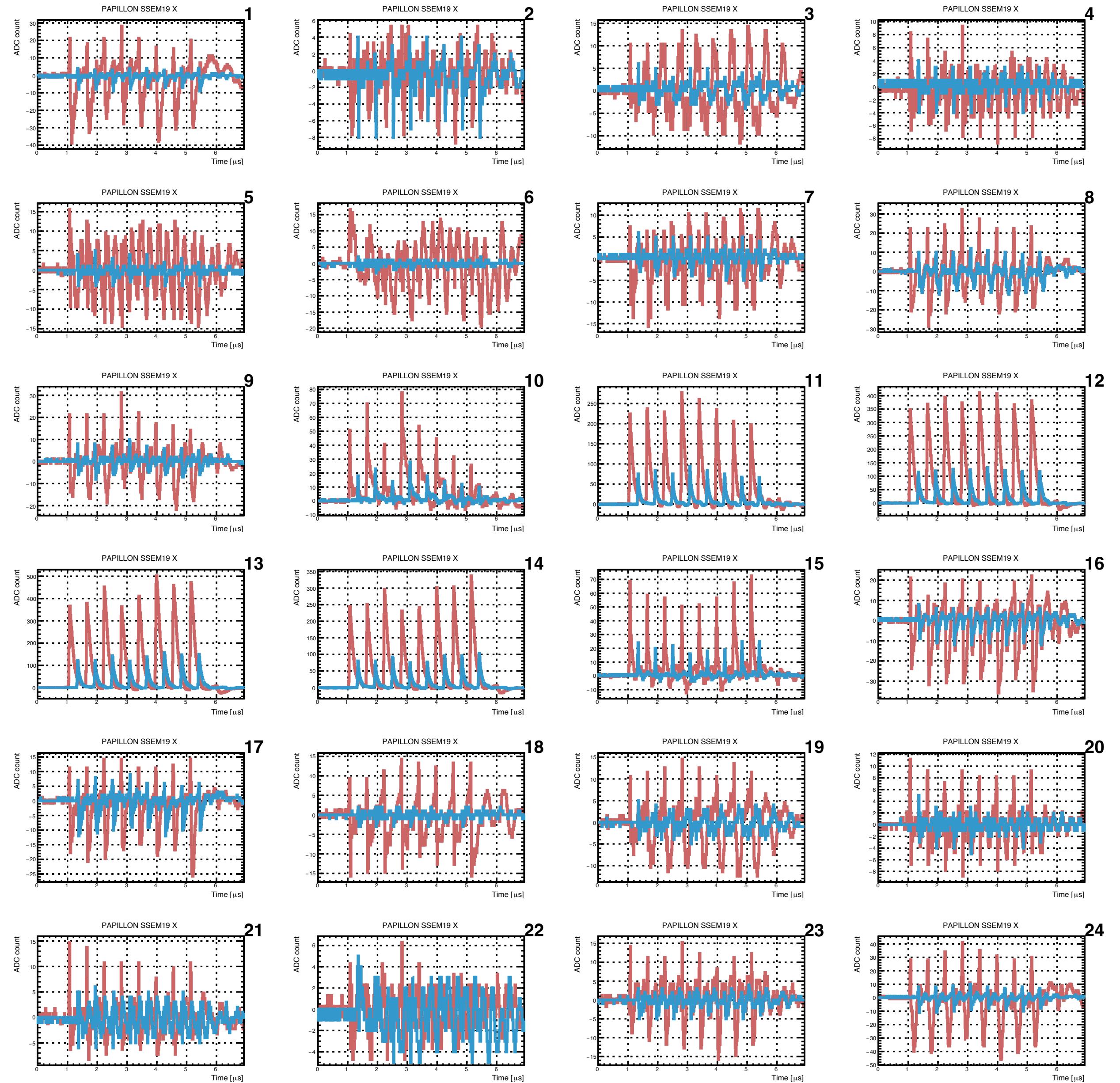
Beam Width under Different Q_{ch} Cut

Run910323 ev79
(Width scan, +0.6 mm)

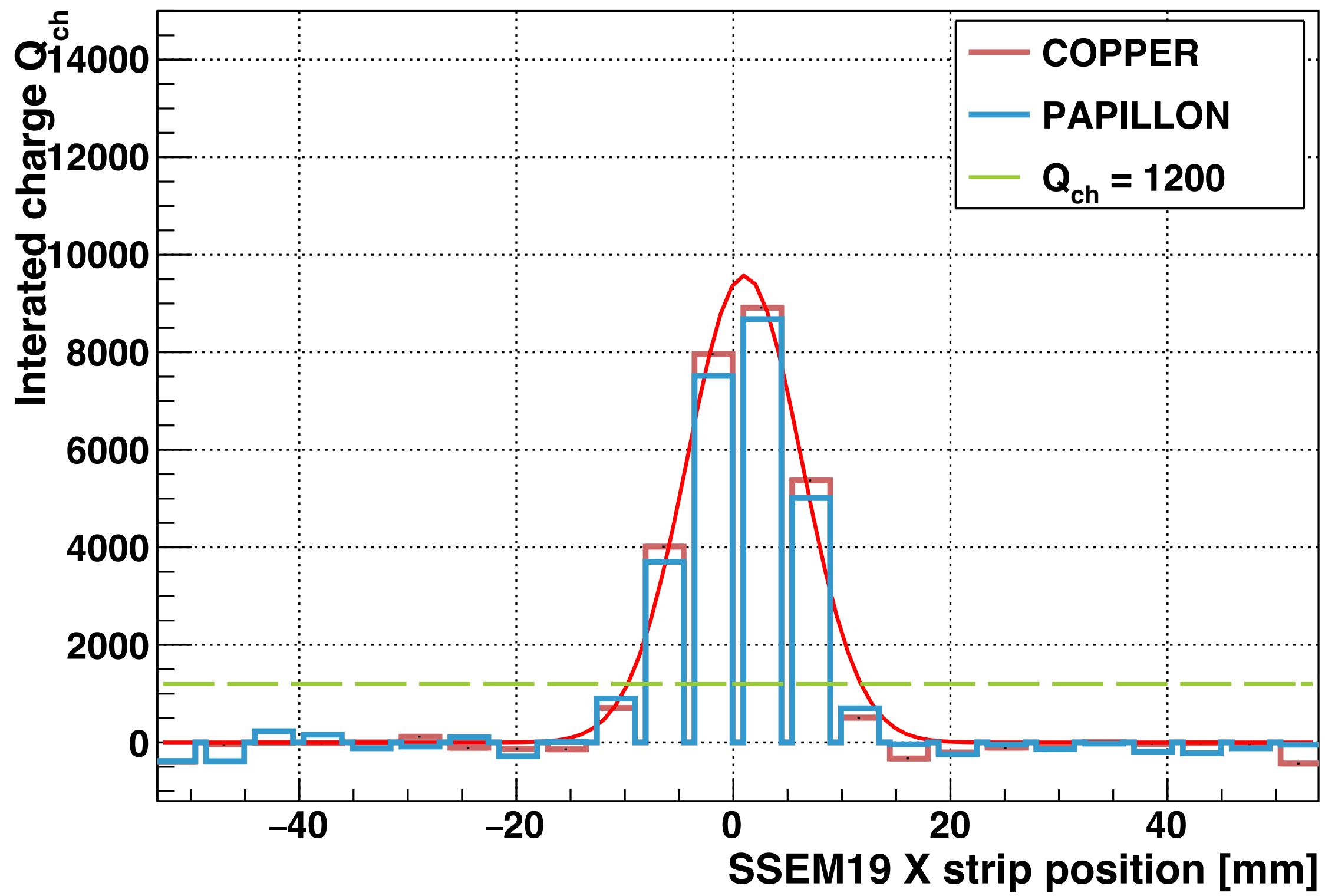


Results of threshold ~500 would be better?

Waveform Comparison

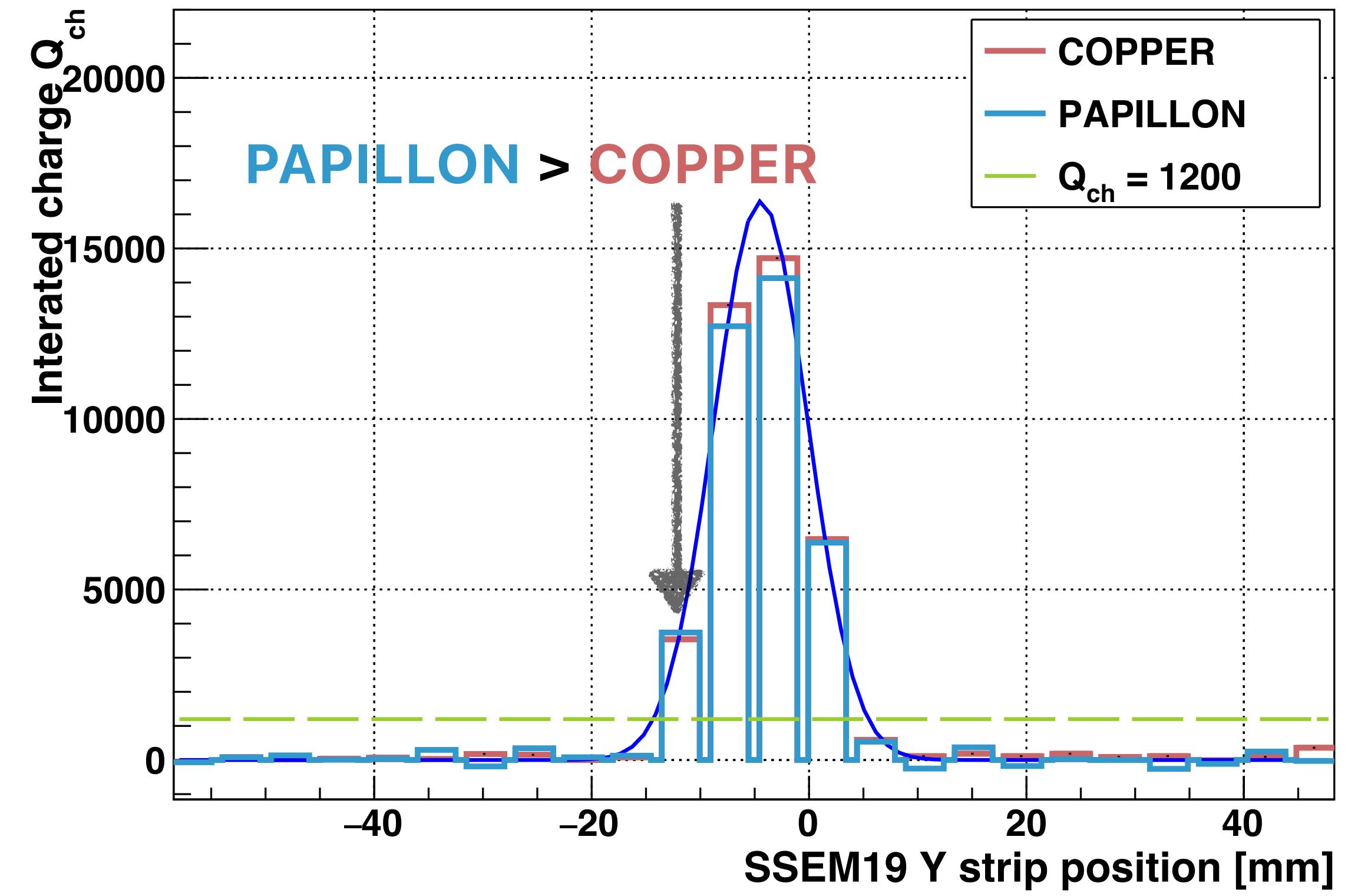
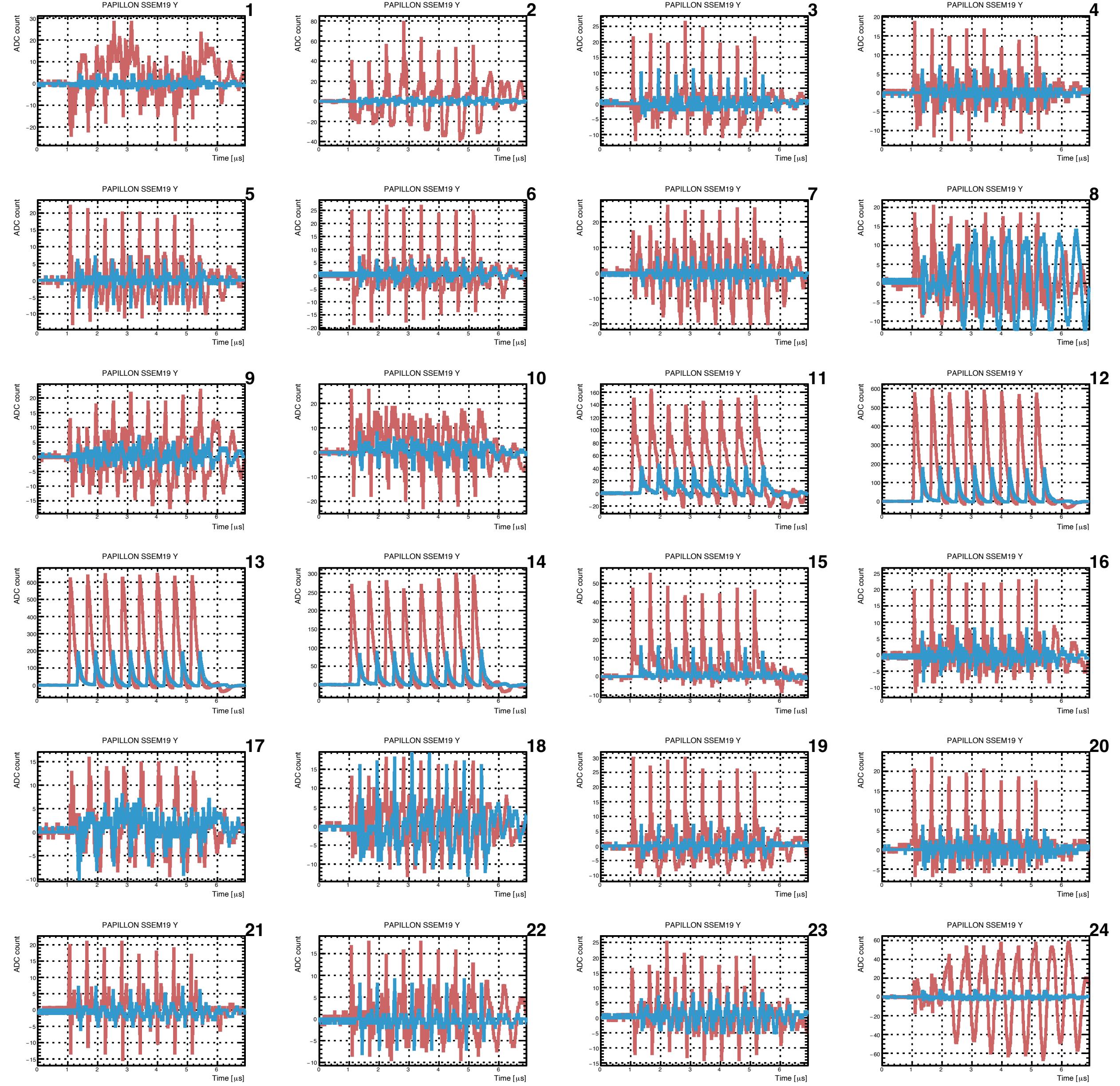


**Basically, the height of PAPILLON waveform
is smaller than that of COPPER.
→ PAPILLON < COPPER**



NOTE) after pedestal subtraction

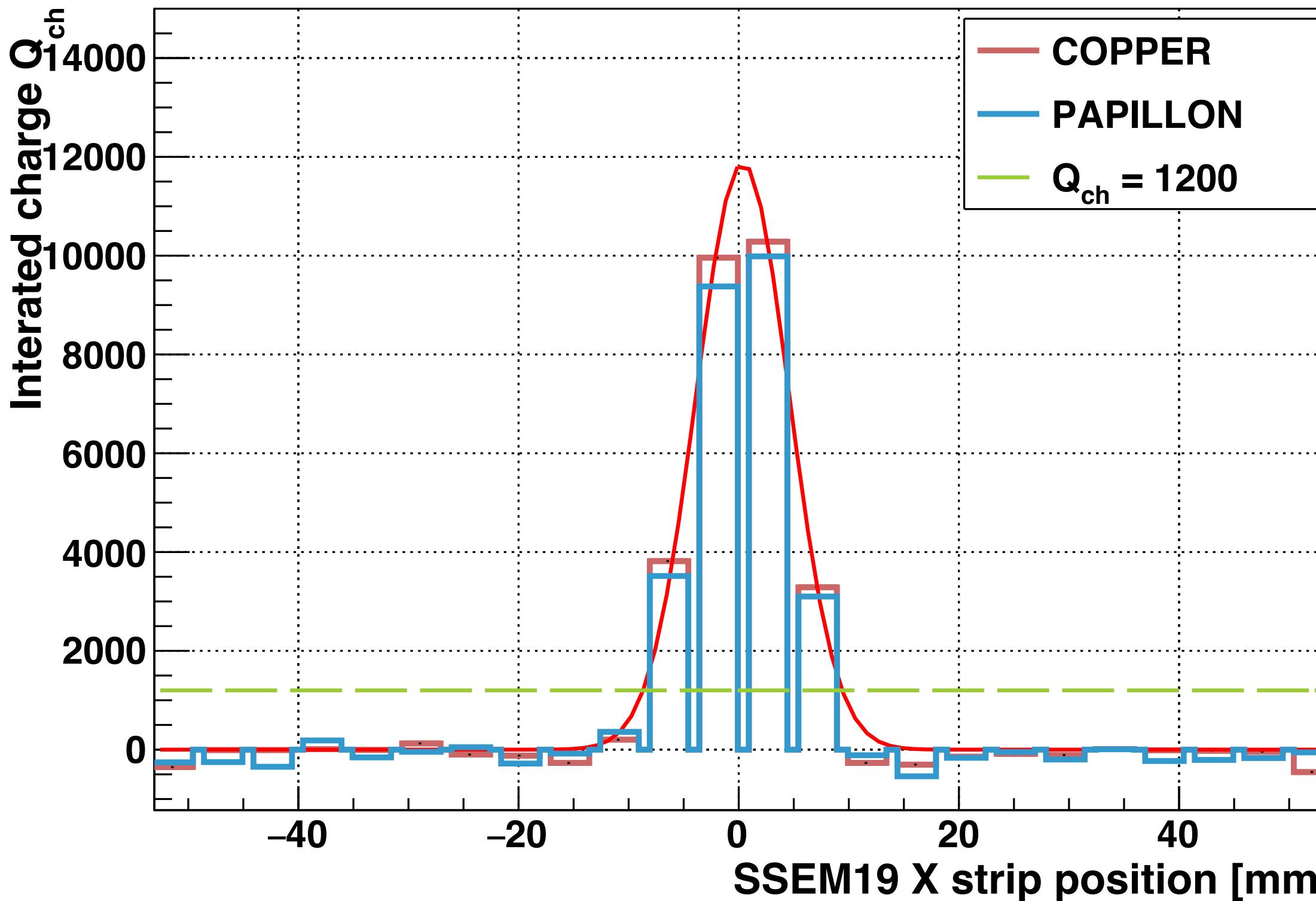
Waveform Comparison



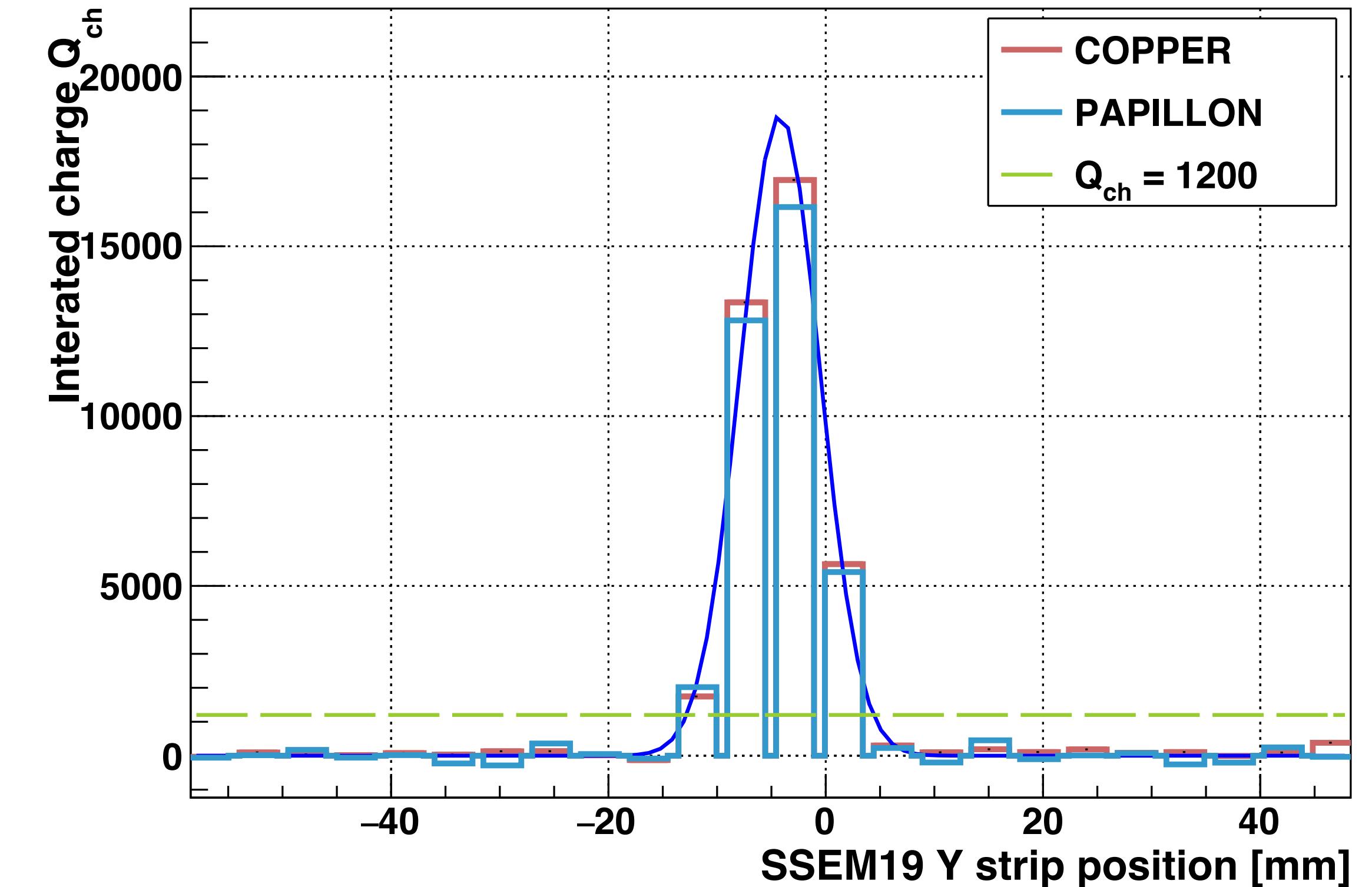
NOTE) after pedestal subtraction

Comparison of Beam Profile (typical case)

Beam width
PAPILLON : 3.91 mm
Offline analysis : 4.19 mm



Beam width
PAPILLON : 3.53 mm
Offline analysis : 3.62 mm

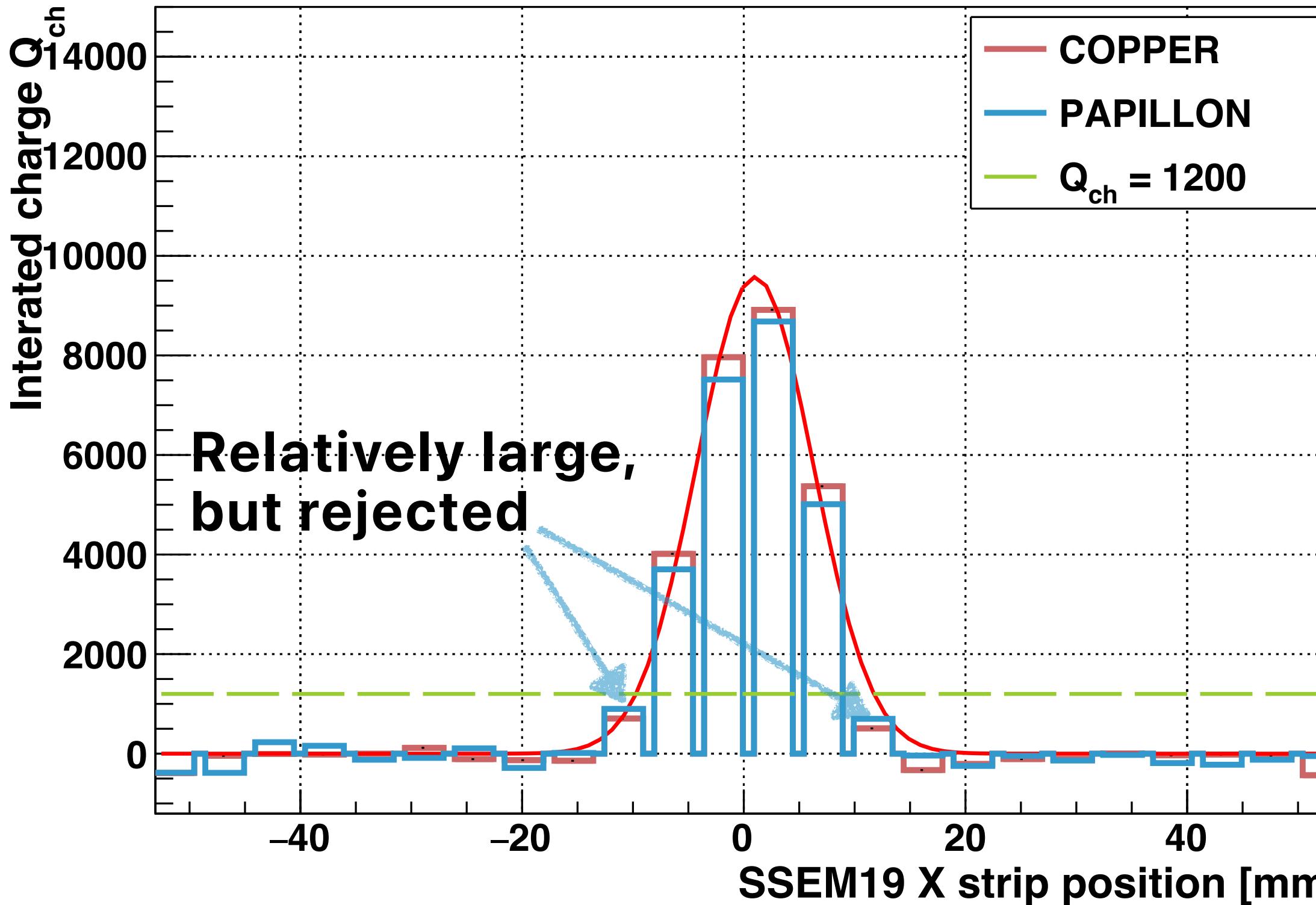


COPPER: after creating a profile for each bunch, add them together.
PAPILLON: Create a profile by spill unit.

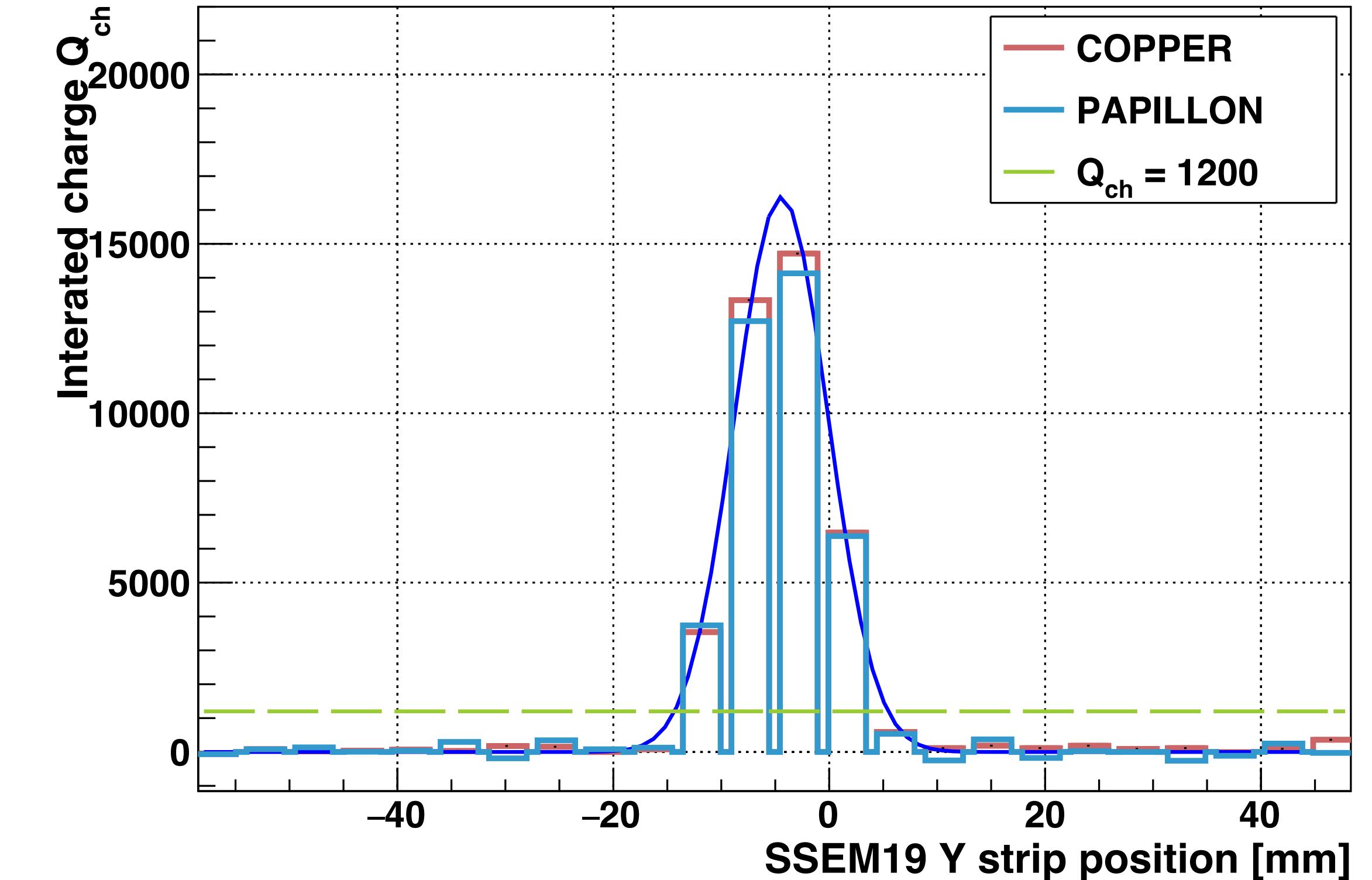
Run910321 ev47
(X position scan)

Comparison of Beam Profile (large discrepancy case)

Beam position
PAPILLON : 0.88 mm
 Offline analysis : 1.00 mm



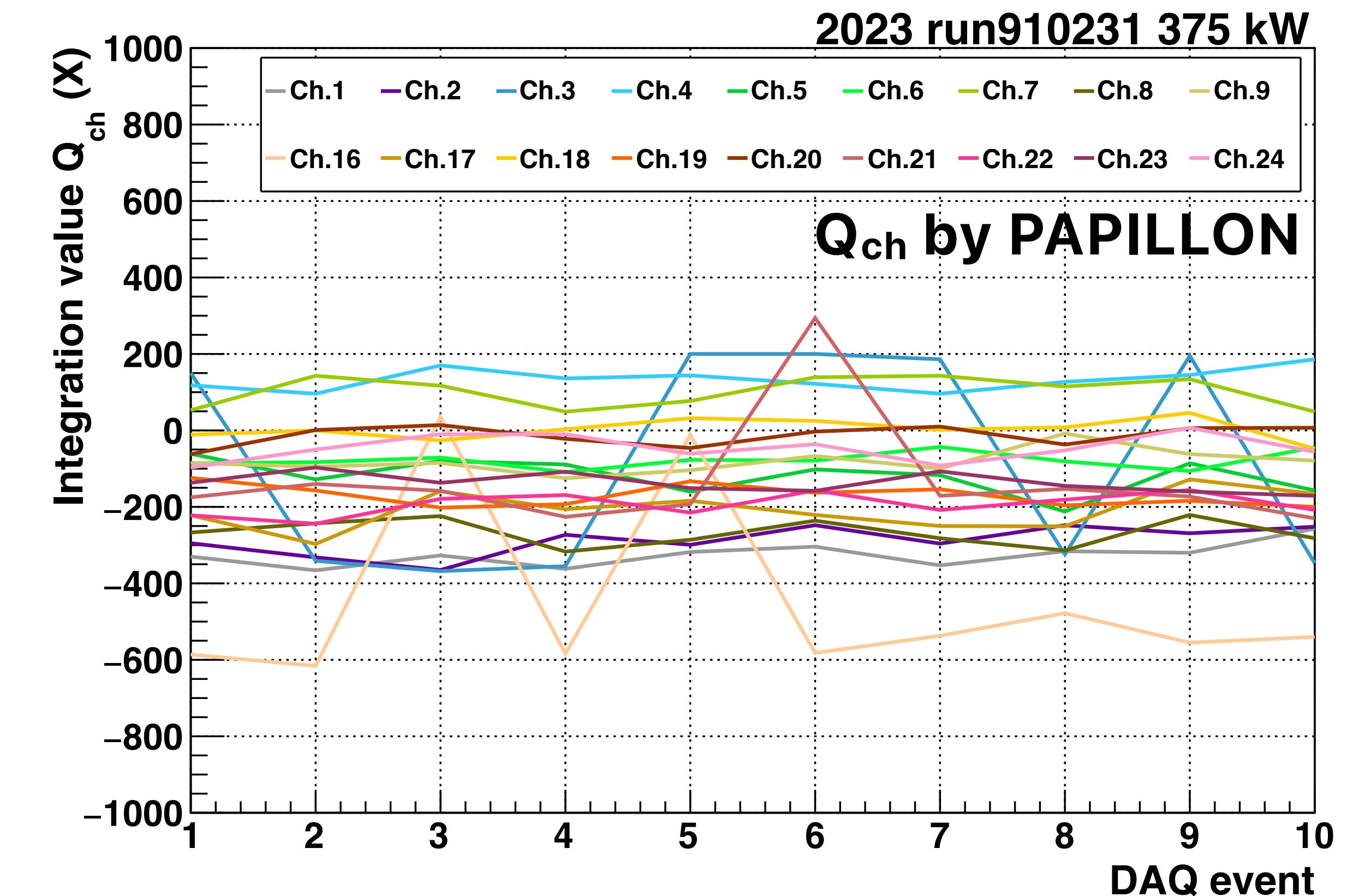
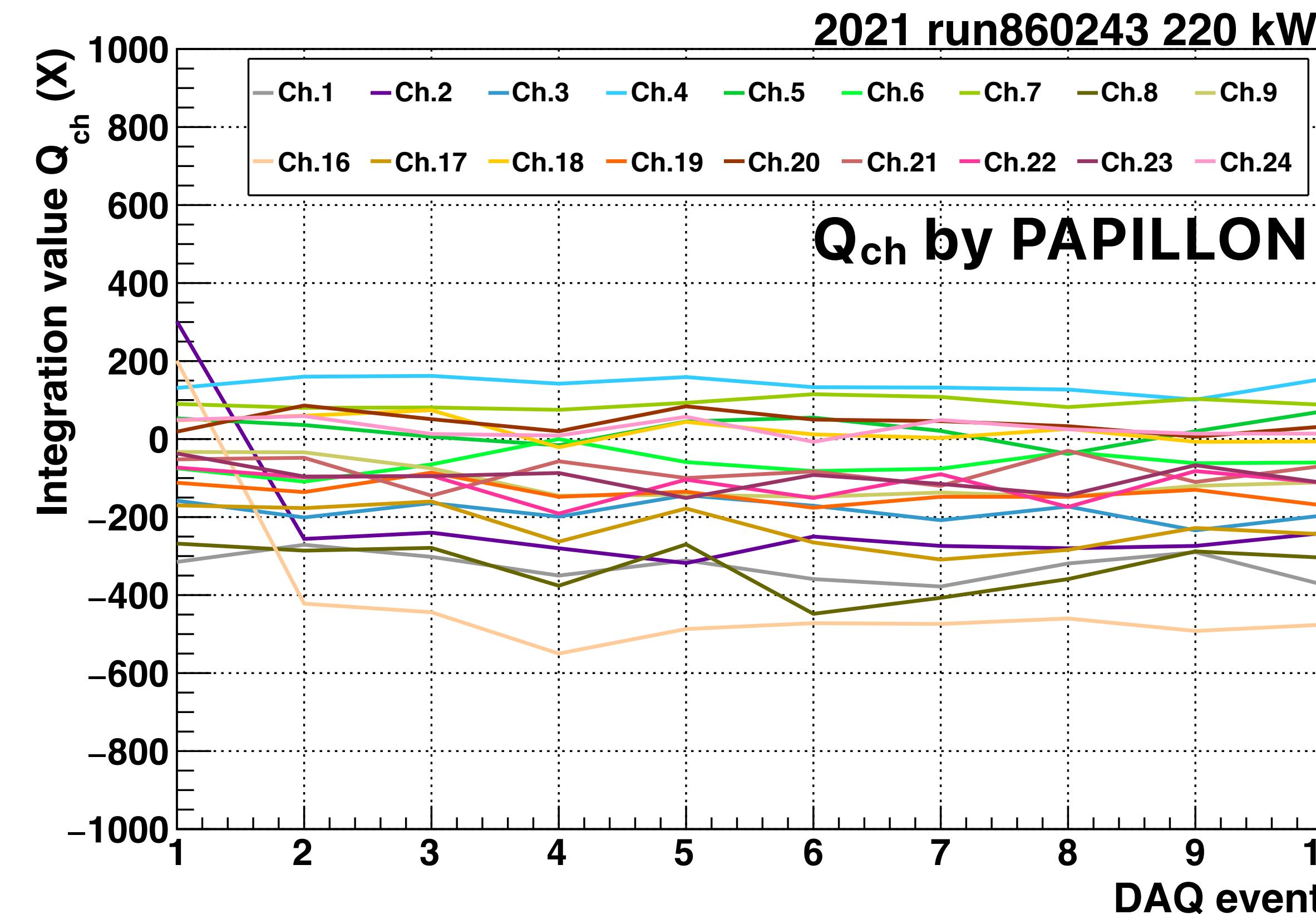
Beam position
PAPILLON : -4.5 mm
 Offline analysis : -4.44 mm



If the threshold is lowered from 1200 to 500 :
 PAPILLON beam position: 0.77 mm (X), -4.35 mm (Y)

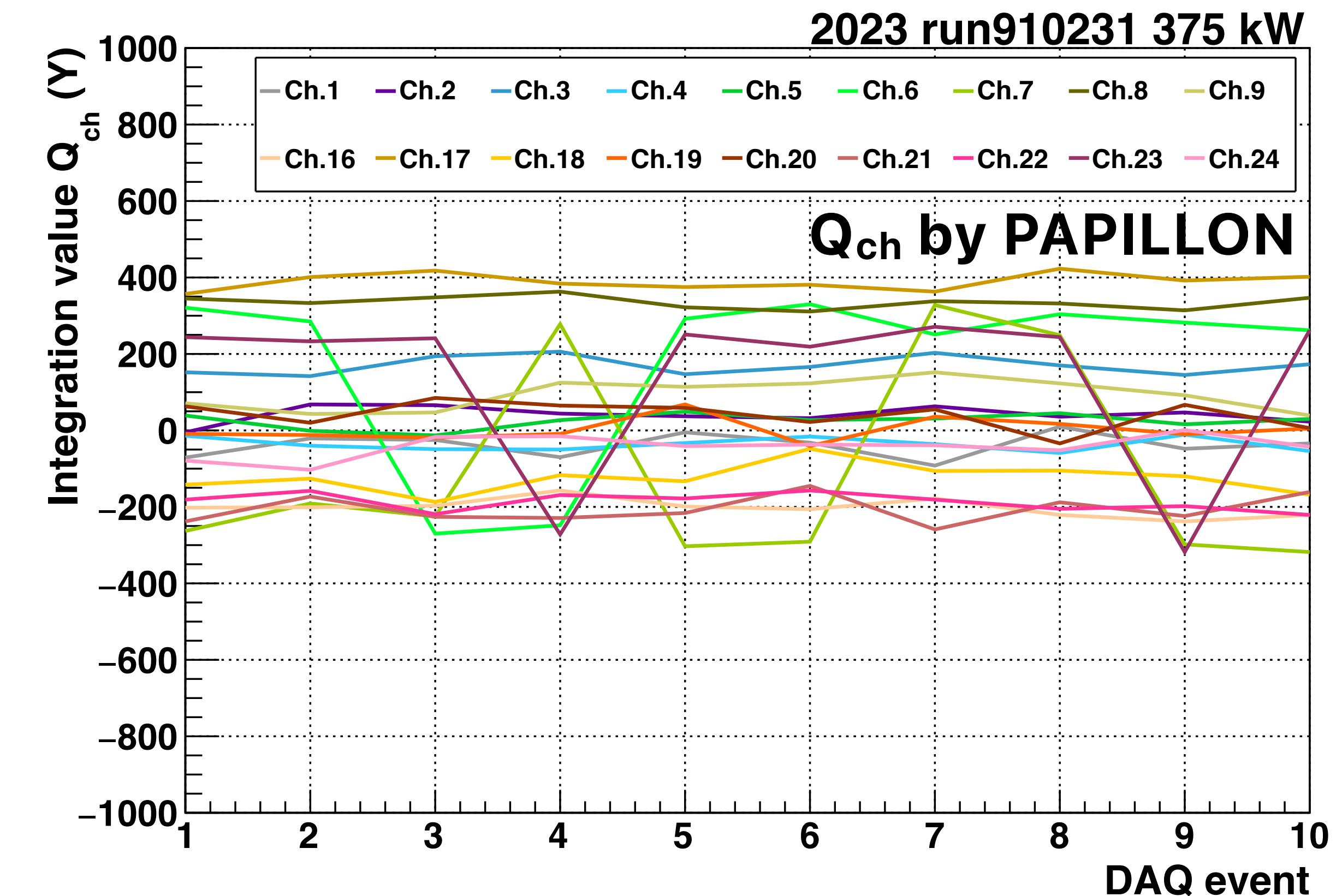
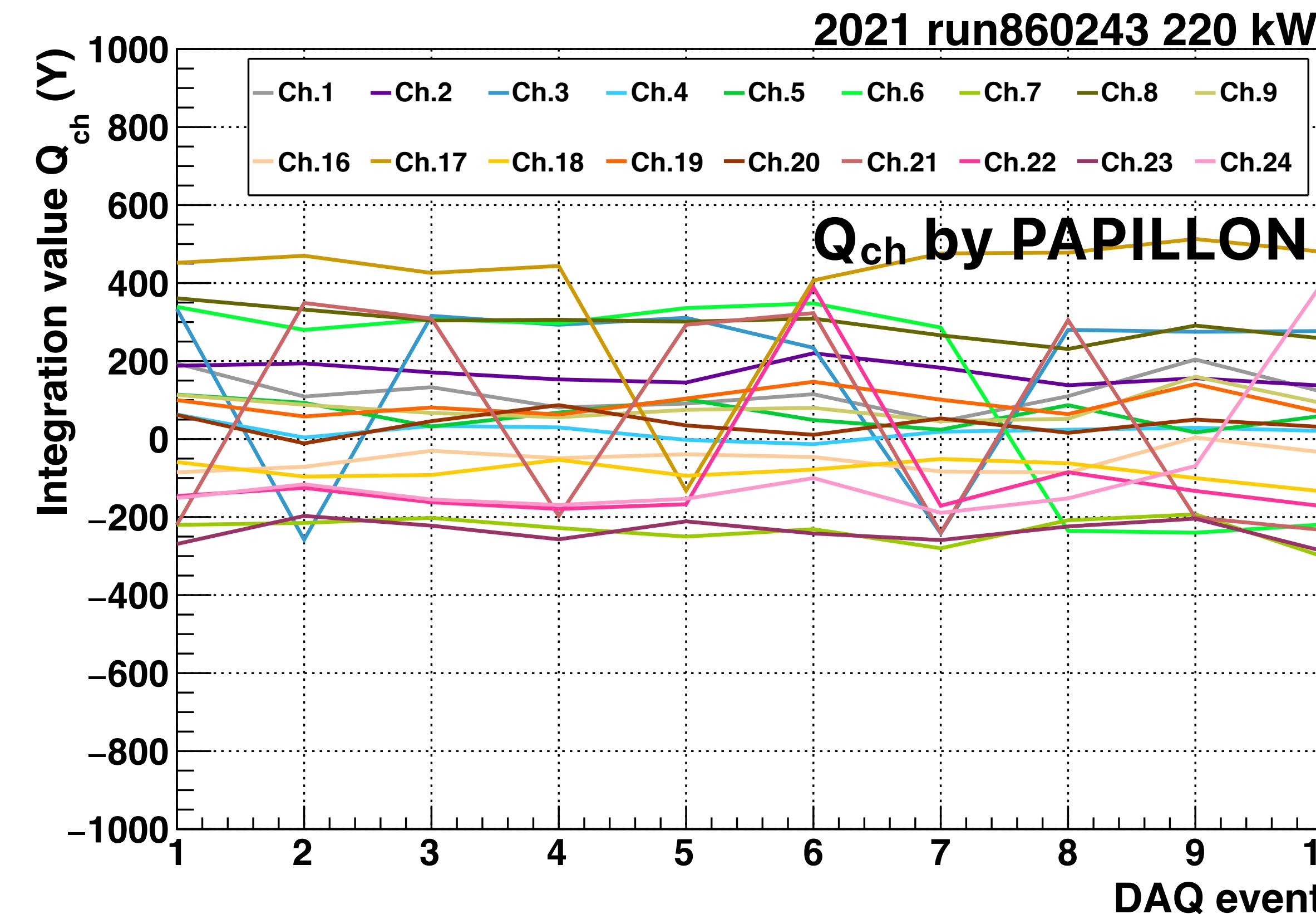
Run910323 ev79
 (width scan)

Contribution of Edge Strips (X)



Q_{ch} @edge strip does not change even at ~1.7 times beam intensity.
 → We may change the threshold e.g. 1200→500.

Contribution of Edge Strips (Y)



Q_{ch} @edge strip does not change even at ~1.7 times beam intensity.
→ We may change the threshold e.g. 1200 → 500.