

Results of the B-field measurements

ERLANGEN CENTRE
FOR ASTROPARTICLE
PHYSICS

ecap

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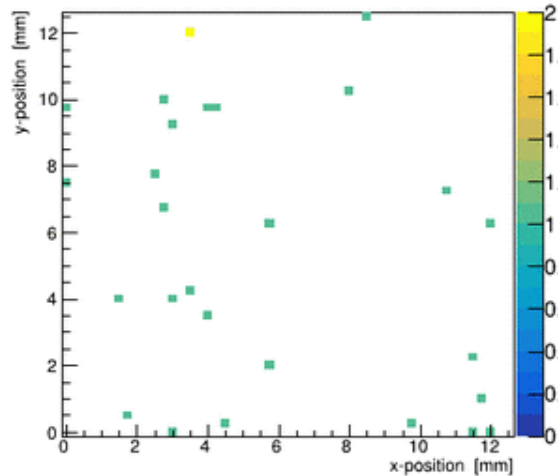
Online Meeting, 27.10.2020



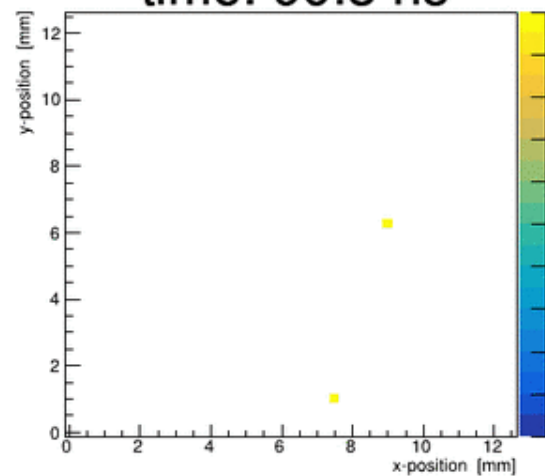
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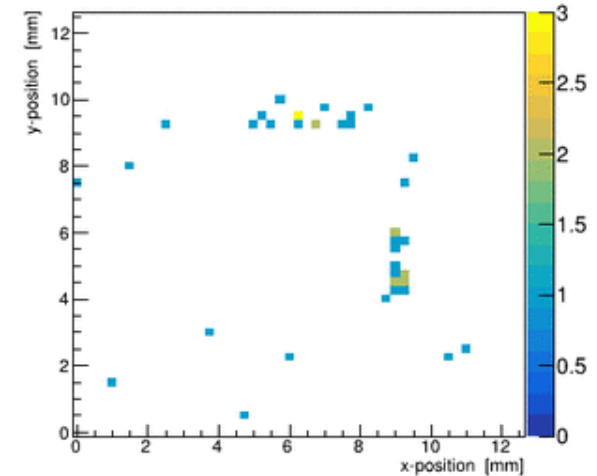
0mT



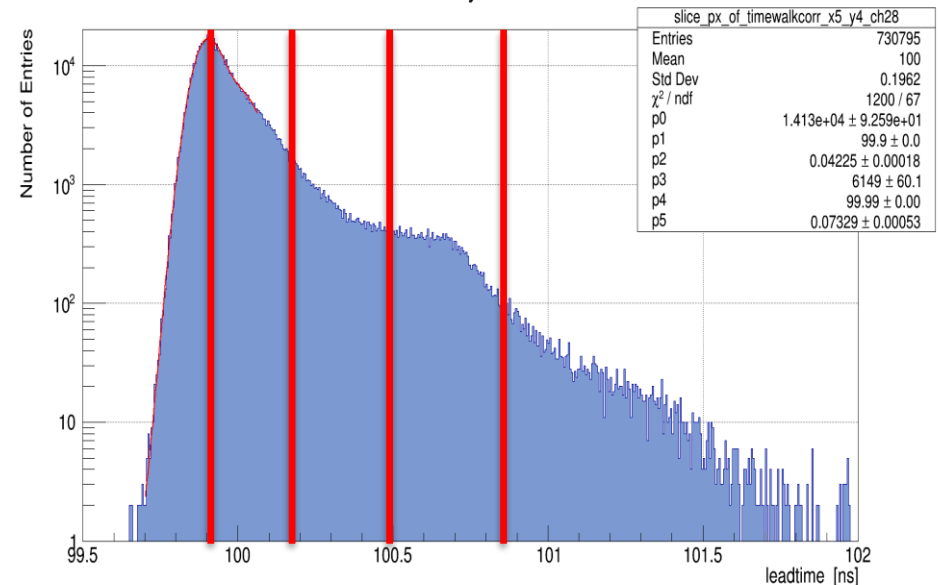
200mT
time: 99.3 ns



1000mT



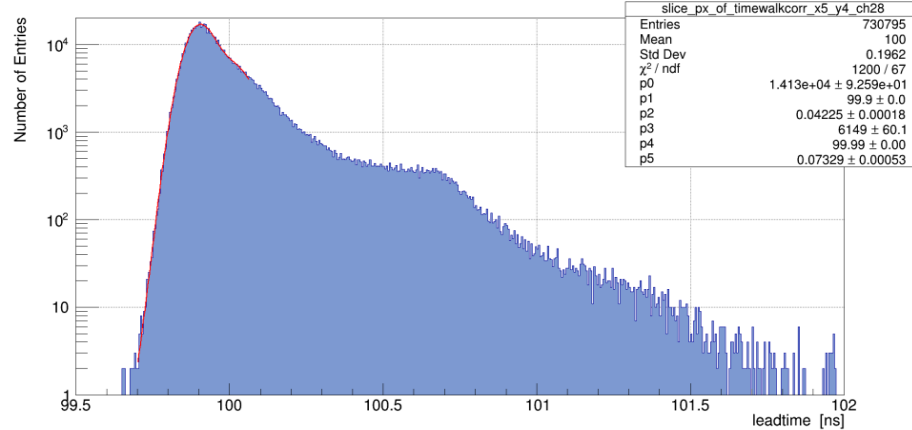
A1200116 0mT x5 y4 timeres



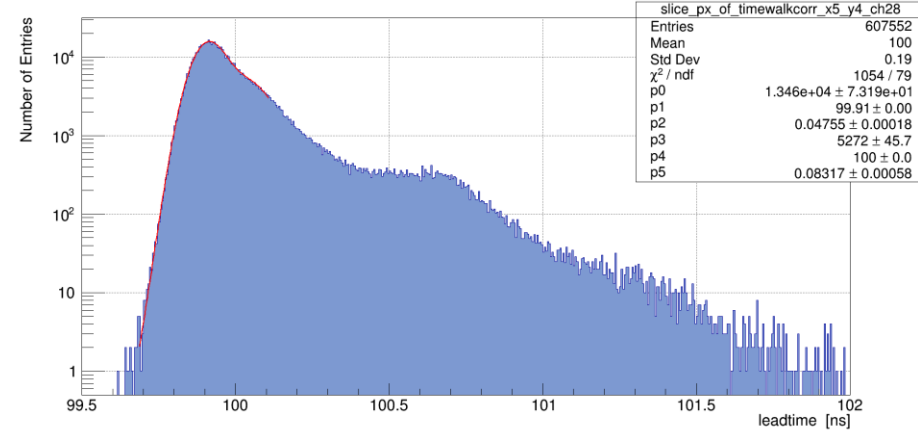
- Spatial expansion of recoil electrons strongly dependent on B-field
- Decrease for higher magnetic field, as expected
- Temporal expansion independent of B-field

B-field TRB-Scan results Photek A1200116: time resolution

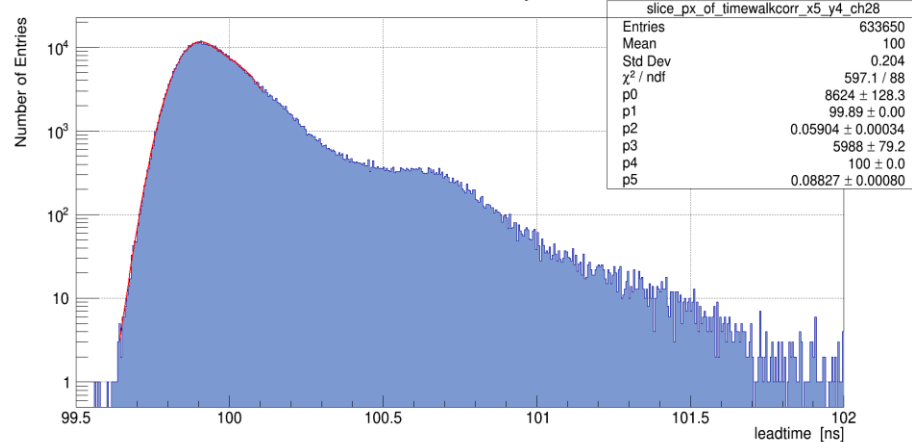
A1200116 0mT x5 y4 timeres



A1200116 200mT x5 y4 timeres



A1200116 1000mT x5 y4 timeres



B-Field	Sigma [ps]	RMS [ps]
0mT	42	196
200mT	48	190
1000mT	59	204

Photonis 9002192: electron recoil

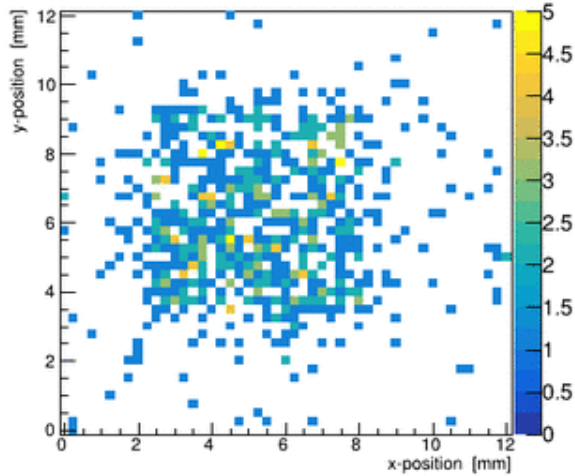


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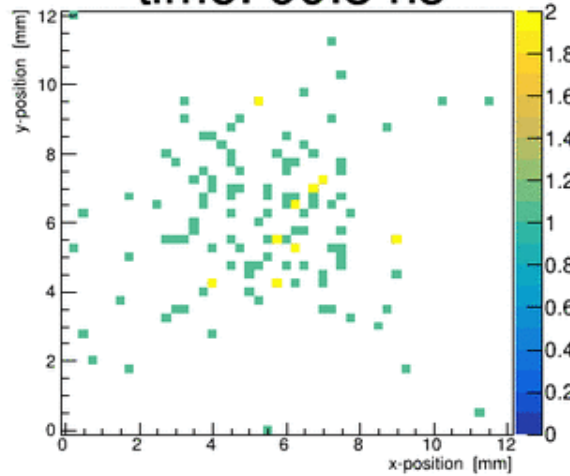


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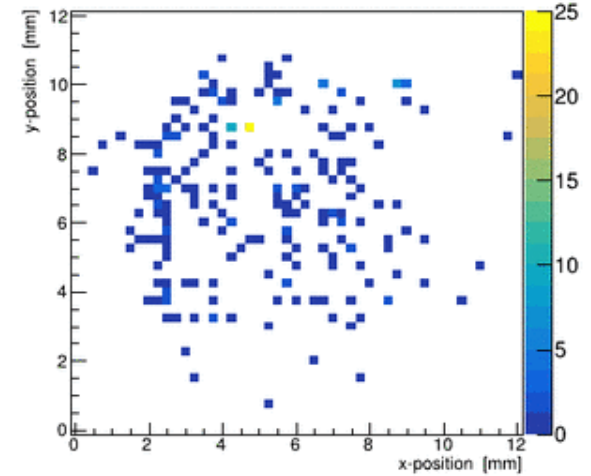
20mT



200mT
time: 99.3 ns

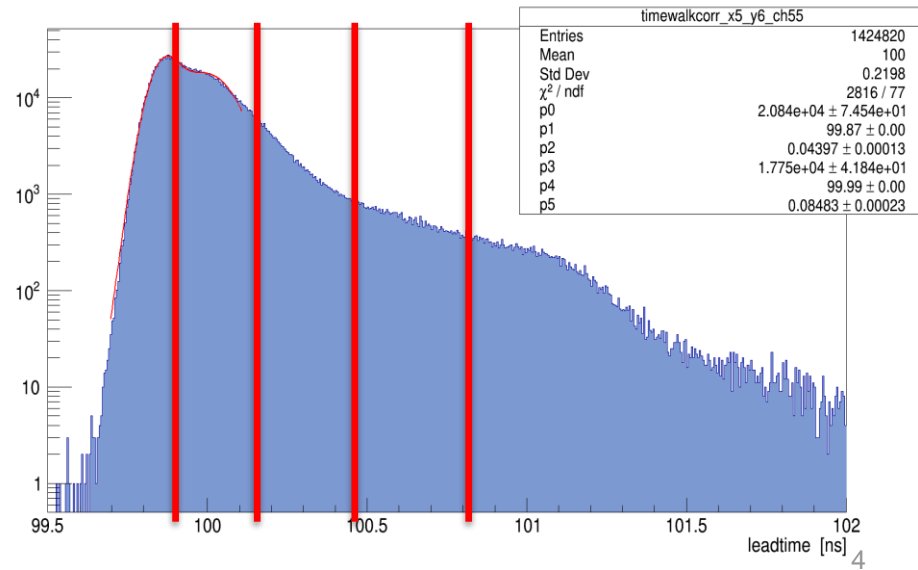


1000mT



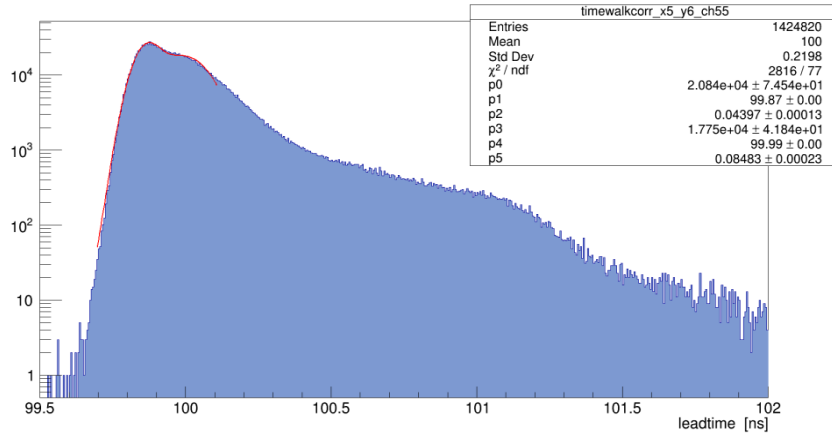
Photonis 9002192 20mT x5 y6

- Same behavior as Photek tube
- Interesting spatial and temporal information of main peak signals, beginning on top left pixel corner then reaching to middle

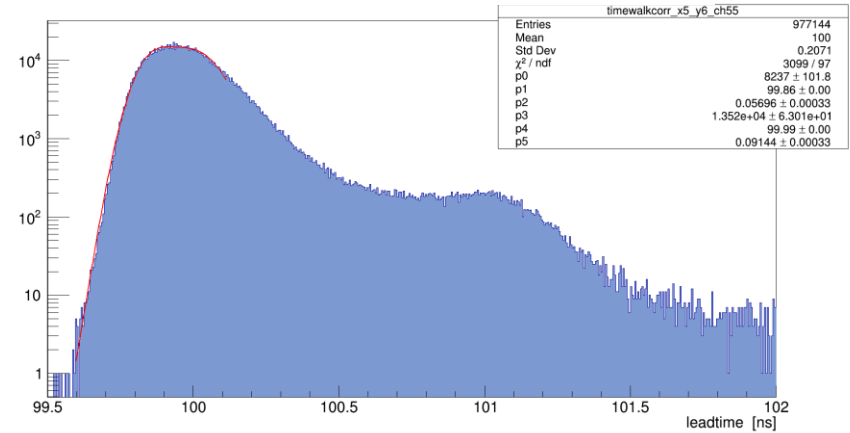


B-field TRB-Scan results Photonis 9002192: time resolution

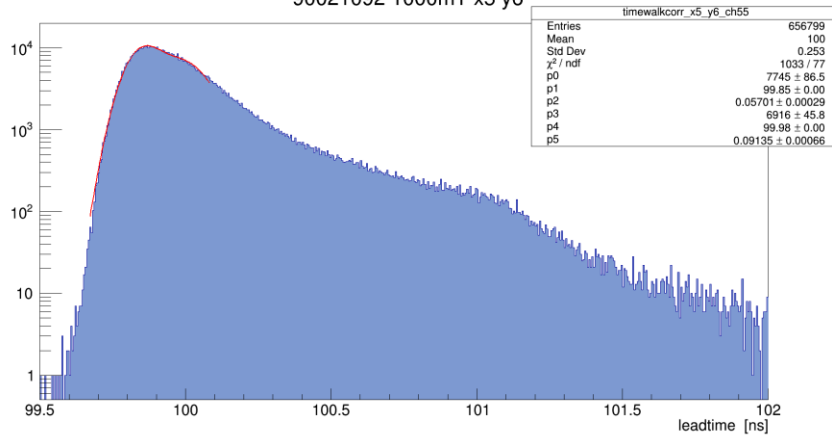
Photonis 9002192 20mT x5 y6



Photonis 9002192 200mT x5 y6



90021092 1000mT x5 y6



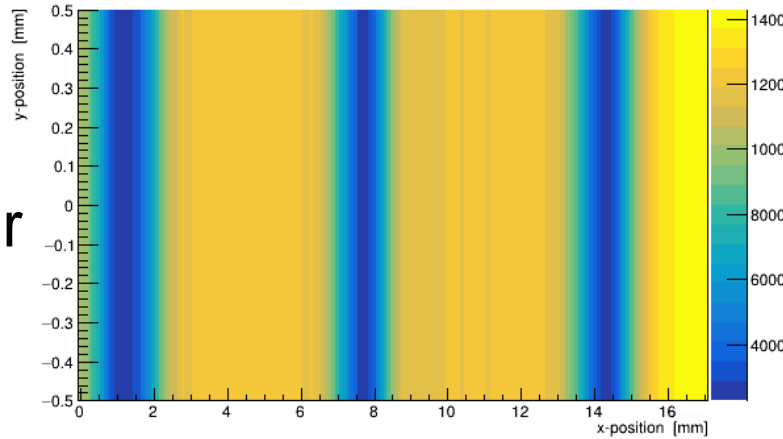
B-Field	Sigma [ps]	RMS [ps]
20mT	44	220
200mT	56 bad fit	207
1000mT	57	253

Photek A1200116: charge sharing crosstalk

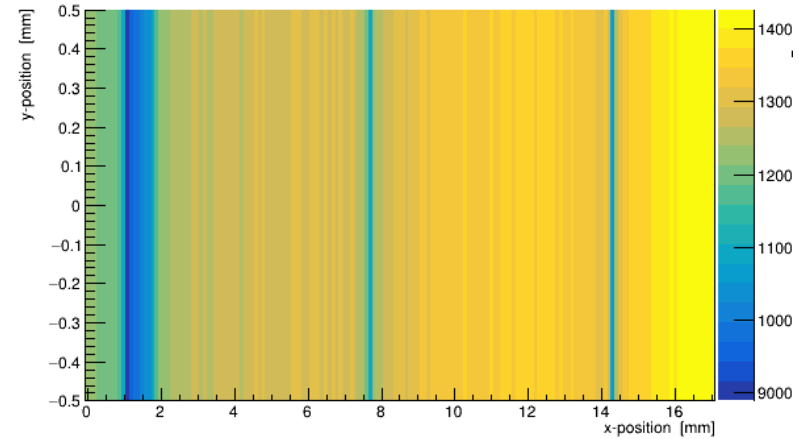
0mT

1000mT

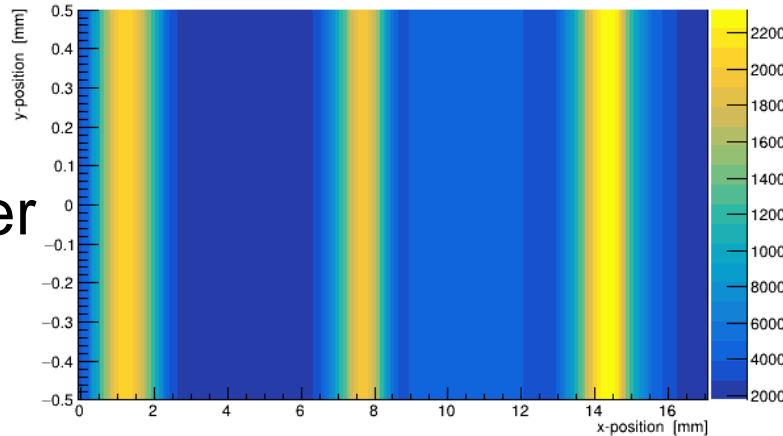
x-position vs y-position (with laser time cut, 1 hit) for (py 0, px 0) channel 0



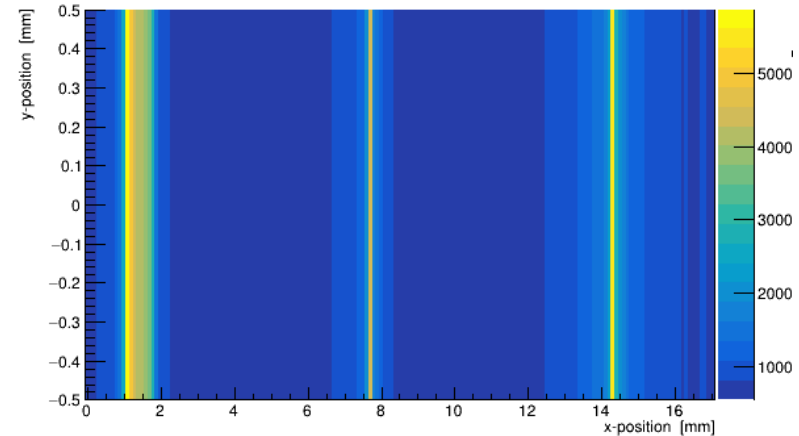
x-position vs y-position (with laser time cut, 1 hit) for (py 0, px 0) channel 0



x-position vs y-position (with laser time cut, 2 hits) for (py 0, px 0) channel 0



x-position vs y-position (with laser time cut, 2 hits) for (py 0, px 0) channel 0



1 hit per pulse

2 hits per pulse

Photek A1200116: charge sharing crosstalk

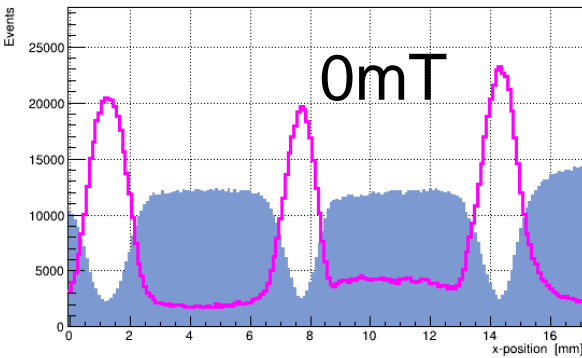


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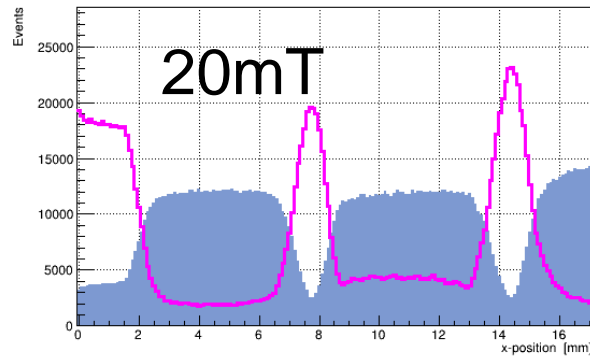


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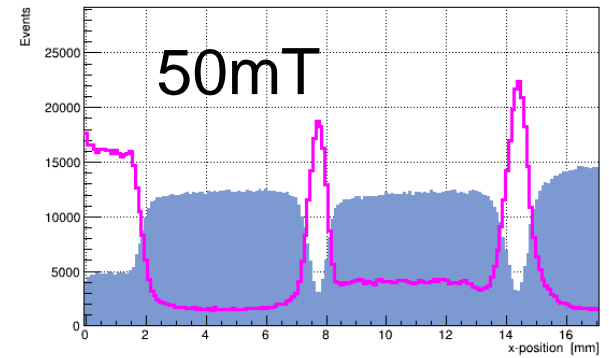
A1200116 0mT 2660V X row 5



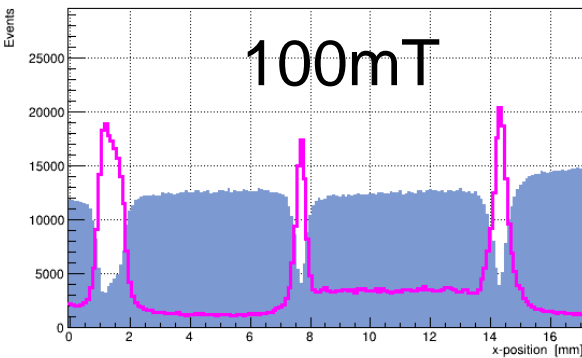
A1200116 20mT 2660V X row 5



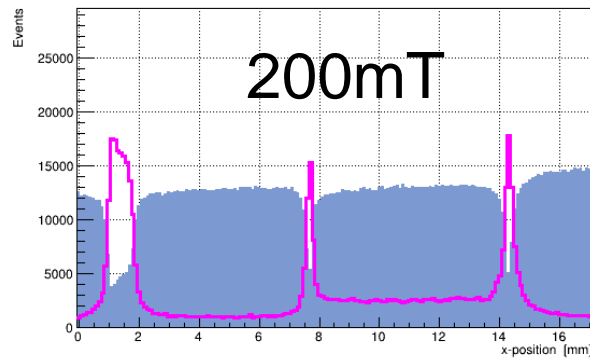
A1200116 50mT 2660V X row 5



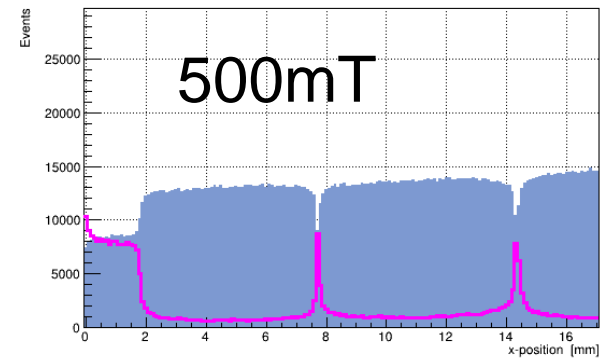
A1200116 100mT 2660V X row 5



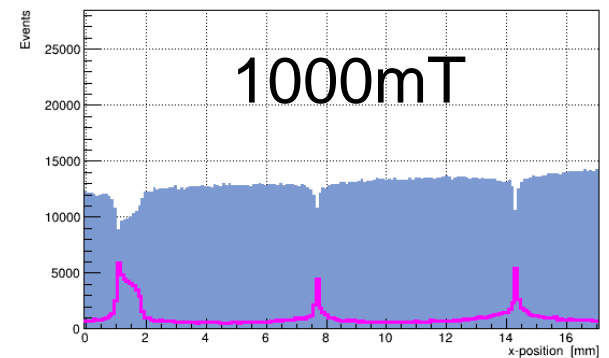
A1200116 200mT 2660V X row 5



A1200116 500mT 2660V X row 5



A1200116 1000mT 2660V X row 5



- Same voltage and threshold for all measurements
- As predicted, charge cloud gets smaller due to increased B-field

Photek A1200116

charge sharing crosstalk



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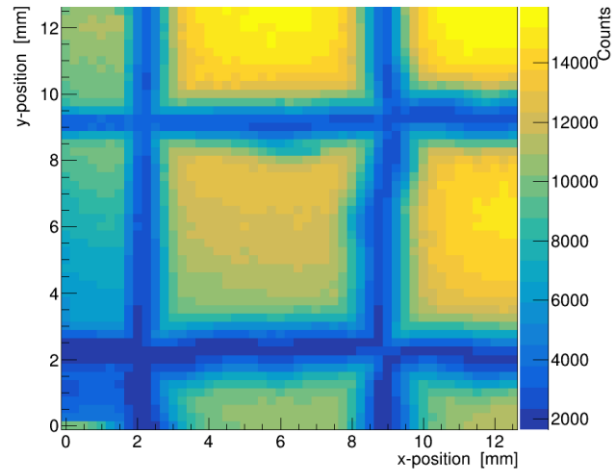
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0mT

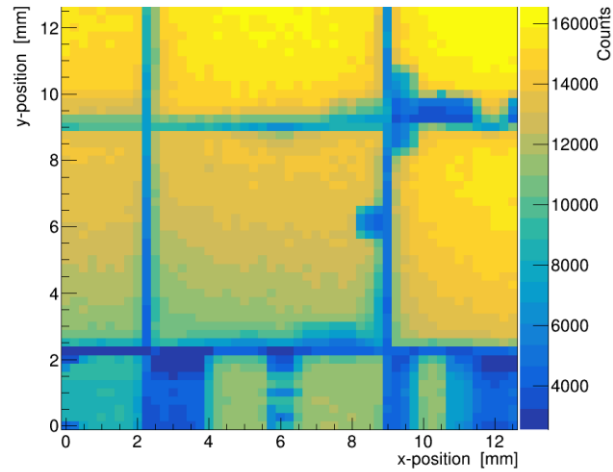
200mT

1000mT

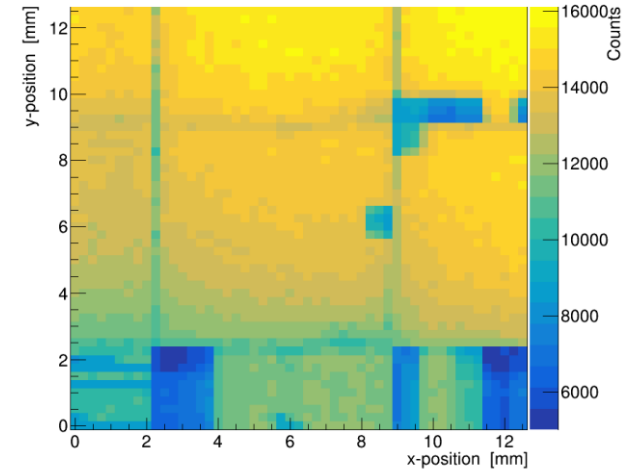
x-position vs y-position (with laser time cut, 1 hit) for (py 0, px 0) channel 0



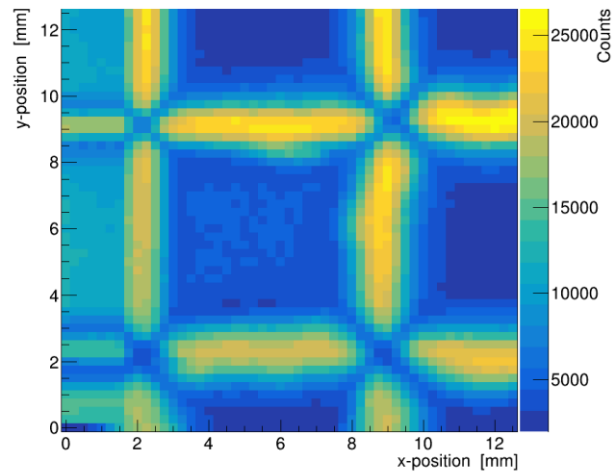
x-position vs y-position (with laser time cut, 1 hit) for (py 0, px 0) channel 0



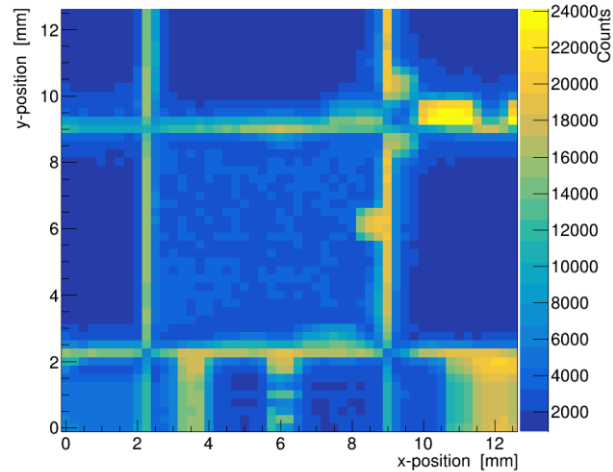
x-position vs y-position (with laser time cut, 1 hit) for (py 0, px 0) channel 0



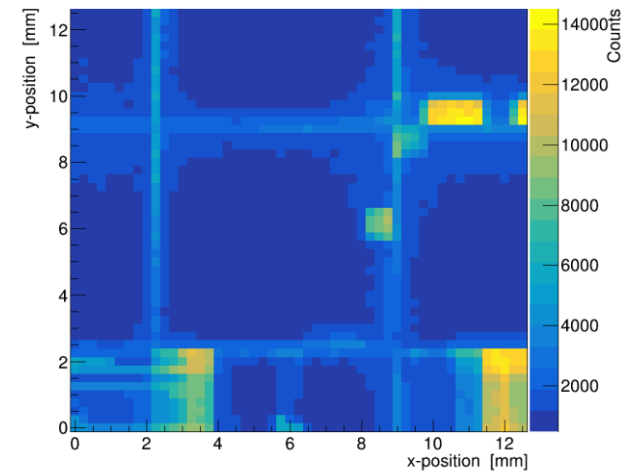
x-position vs y-position (with laser time cut, 2 hits) for (py 0, px 0) channel 0



x-position vs y-position (with laser time cut, 2 hits) for (py 0, px 0) channel 0



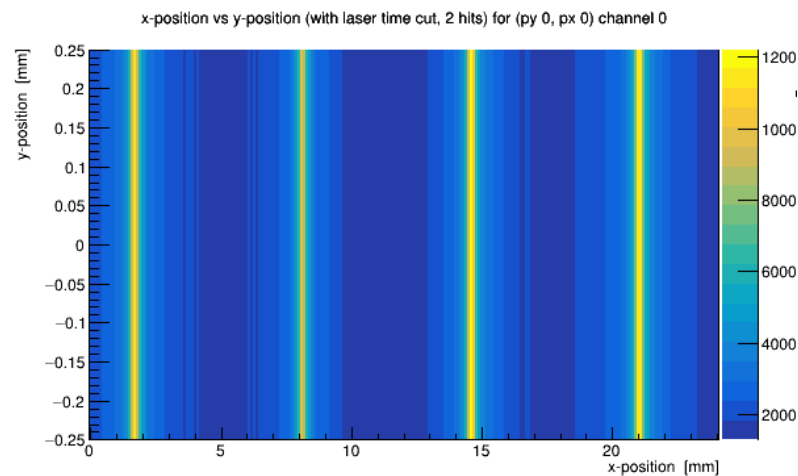
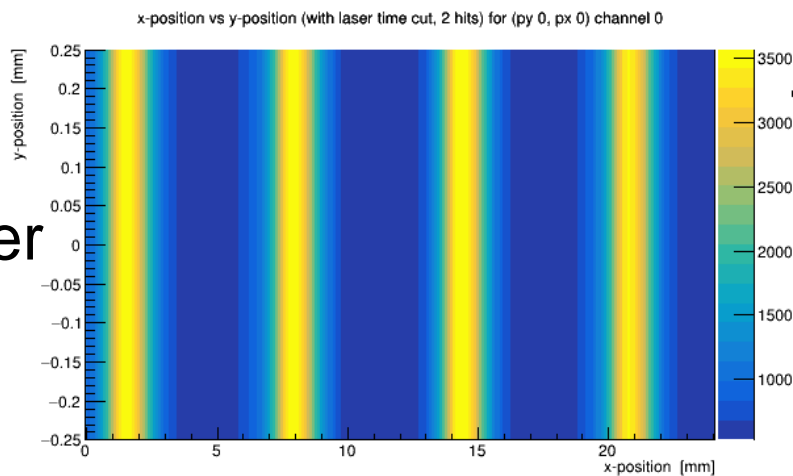
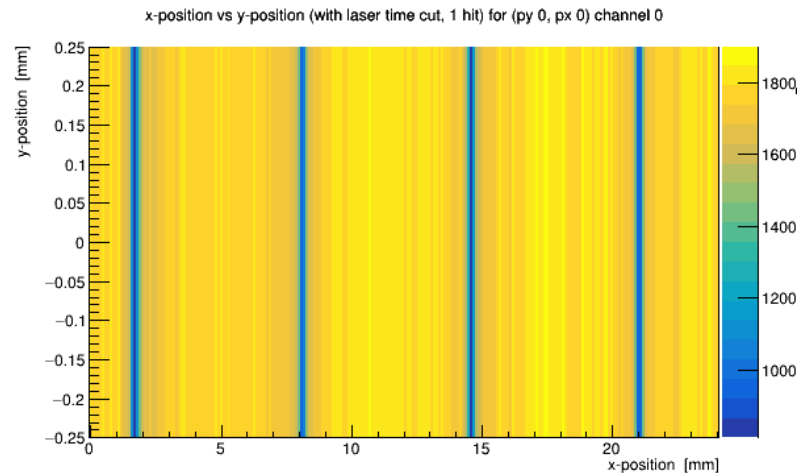
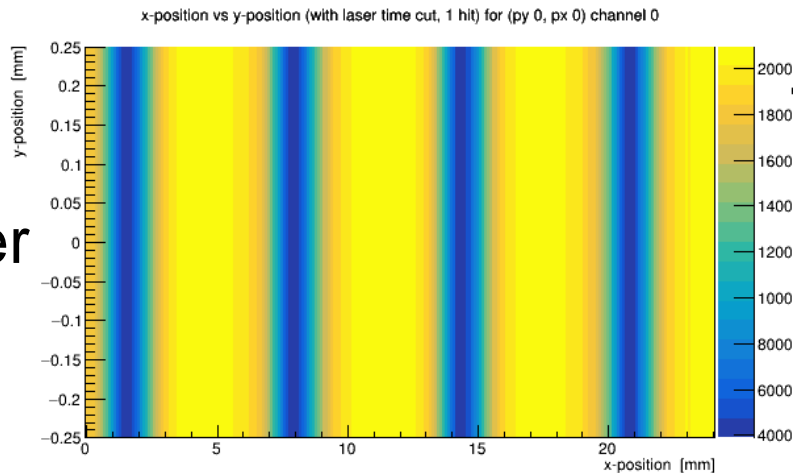
x-position vs y-position (with laser time cut, 2 hits) for (py 0, px 0) channel 0



Photonis 9002192: charge sharing crosstalk

0mT

1000mT



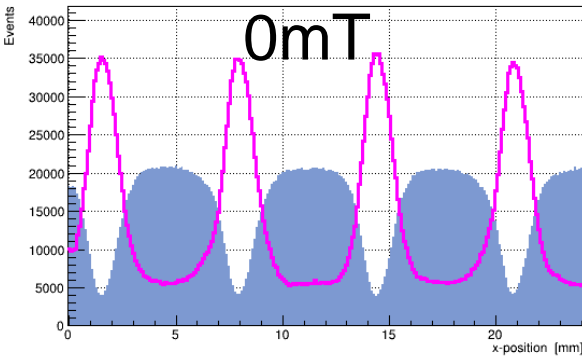
1 hit per pulse

2 hits per pulse

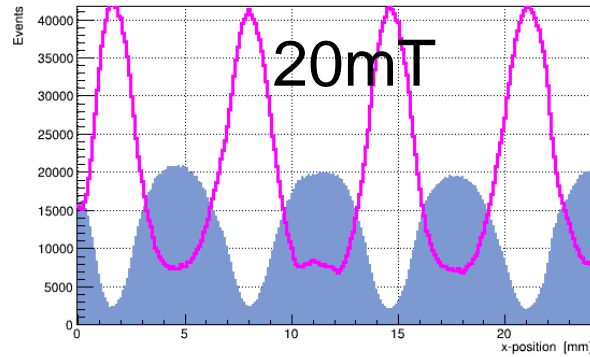
Photonis 9002192: charge sharing crosstalk



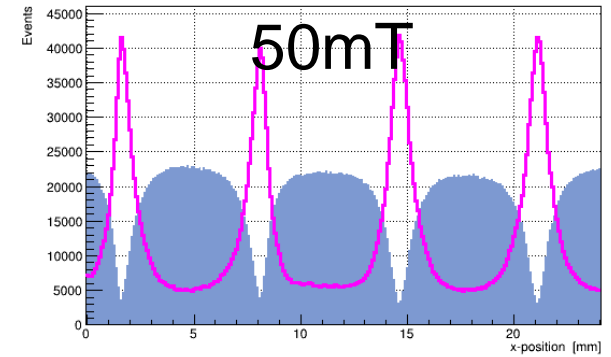
9002192 0mT 2500V X row 5



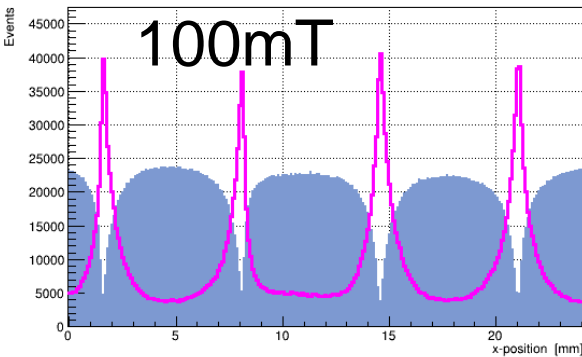
9002192 20mT 2600V X row 5



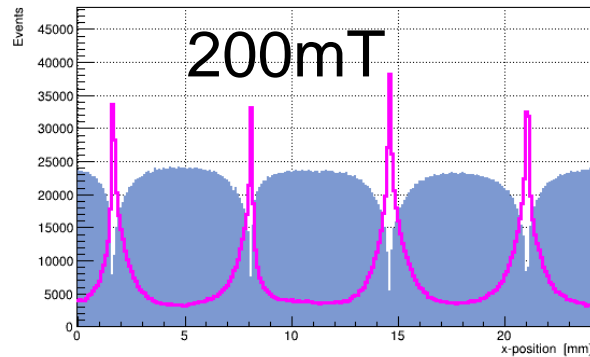
9002192 50mT 2600V X row 5



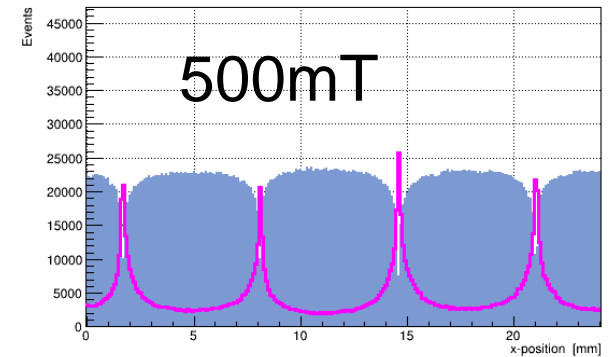
9002192 100mT 2600V X row 5



9002192 200mT 2600V X row 5

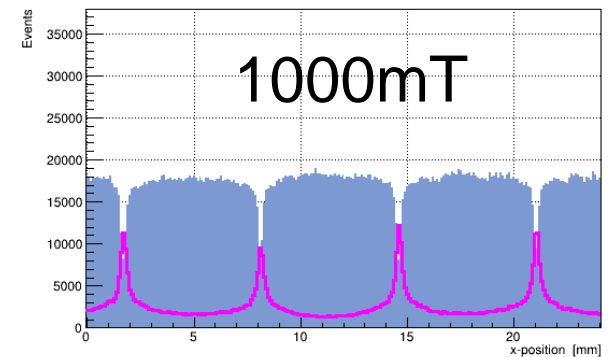


9002192 500mT 2600V X row 5



0mT: 2500V, threshold 500
≥20mT: 2600V, threshold 500
Higher gain but same threshold
→ more 2 hit signals

9002192 1000mT 2600V X row 5

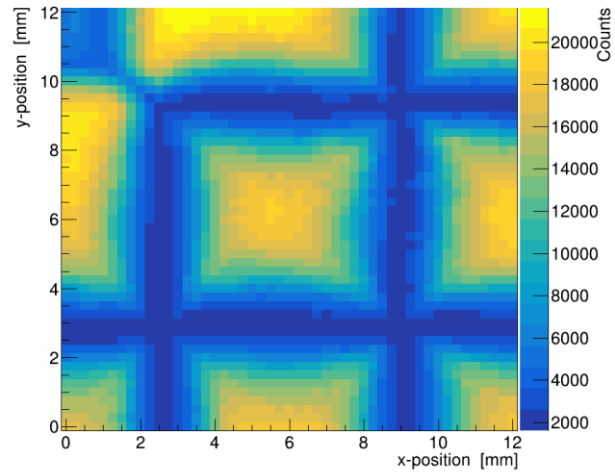


20mT

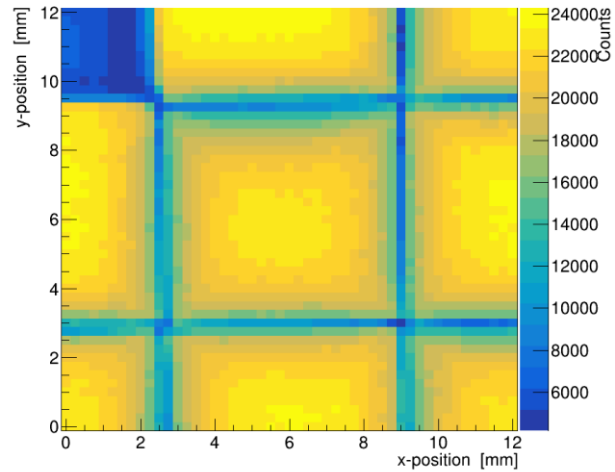
200mT

1000mT

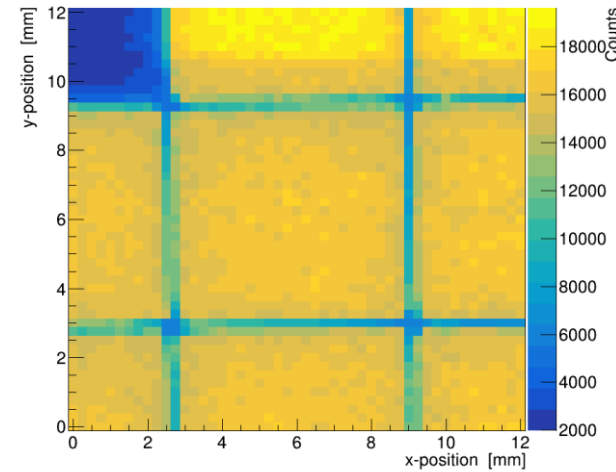
x-position vs y-position (with laser time cut, 1 hit) for (py 0, px 0) channel 0



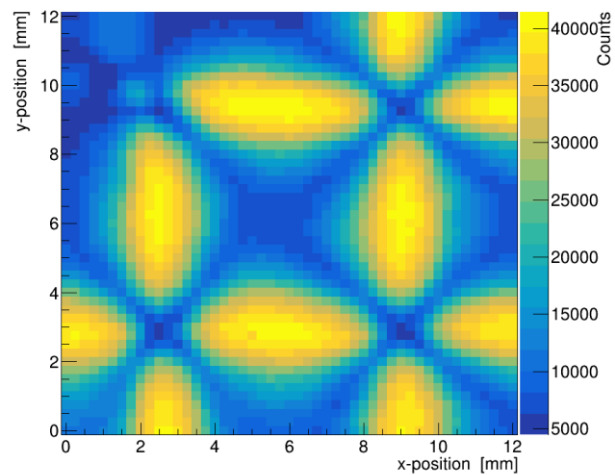
x-position vs y-position (with laser time cut, 1 hit) for (py 0, px 0) channel 0



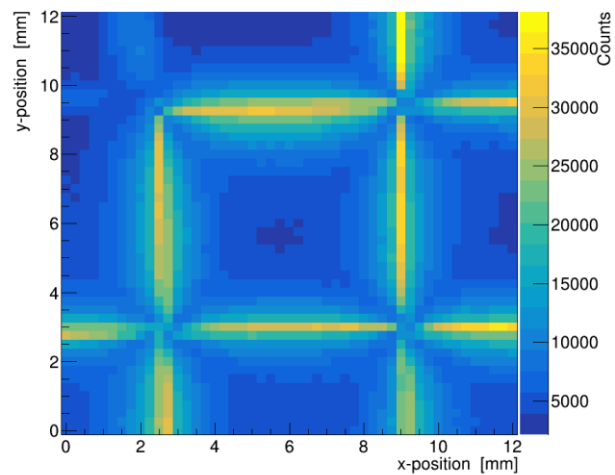
x-position vs y-position (with laser time cut, 1 hit) for (py 0, px 0) channel 0



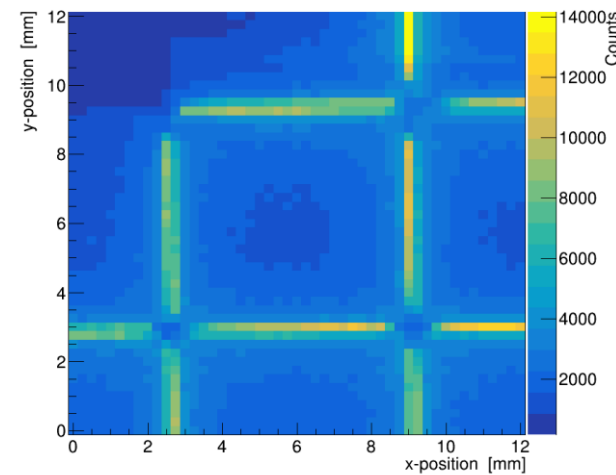
x-position vs y-position (with laser time cut, 2 hits) for (py 0, px 0) channel 0



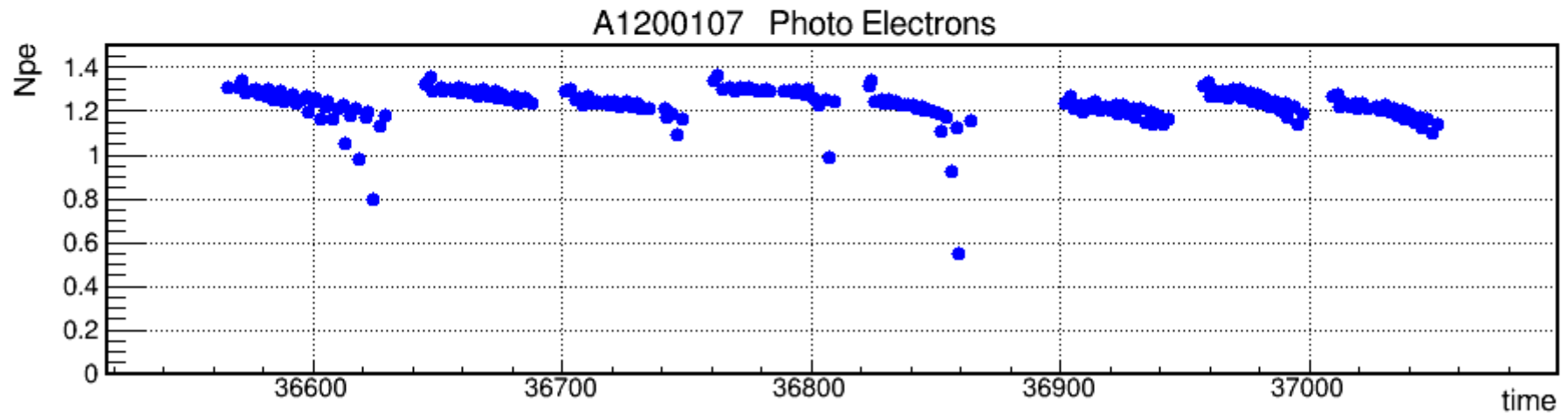
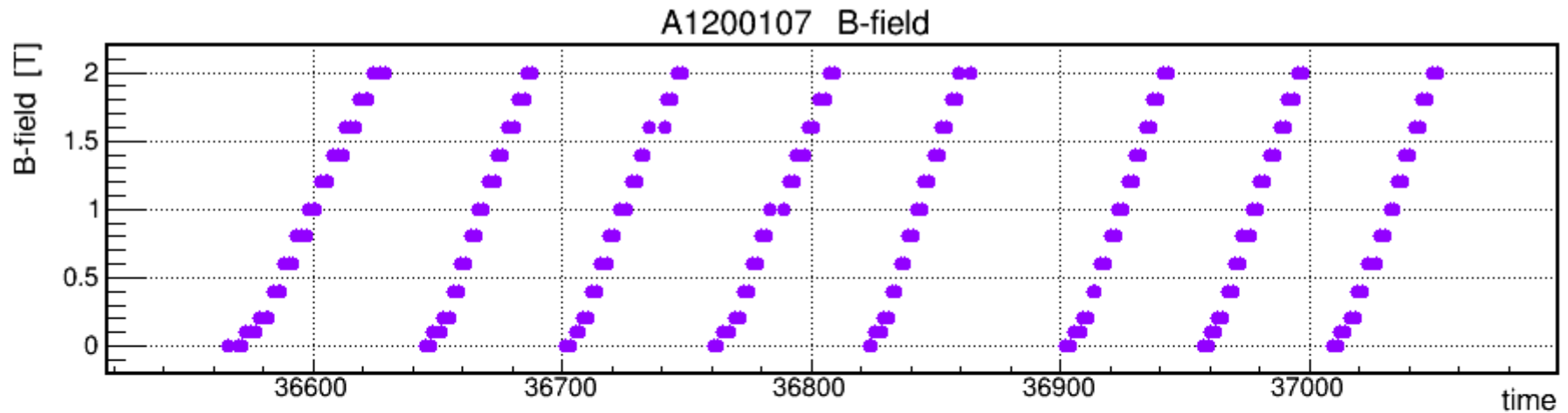
x-position vs y-position (with laser time cut, 2 hits) for (py 0, px 0) channel 0



x-position vs y-position (with laser time cut, 2 hits) for (py 0, px 0) channel 0



N. Pe dependency on B-Field?



Similar also for Photonis 8x8 and 3x100 tubes
Further investigation next time in Jülich

Summary B-field measurements

- Electron recoil shows expected behavior
 - For larger applied B-fields spatial expansion decreases significantly
 - Temporal expansion not affected by B-field
- Main peak structure needs more investigation
 - Time resolution gets worse for high B-fields?
 - Main peak structure changes?
- Charge sharing crosstalk behavior as predicted
 - For higher B-fields charge cloud gets smaller, as seen for 2 hit distributions
- All shown properties change similar for both tubes