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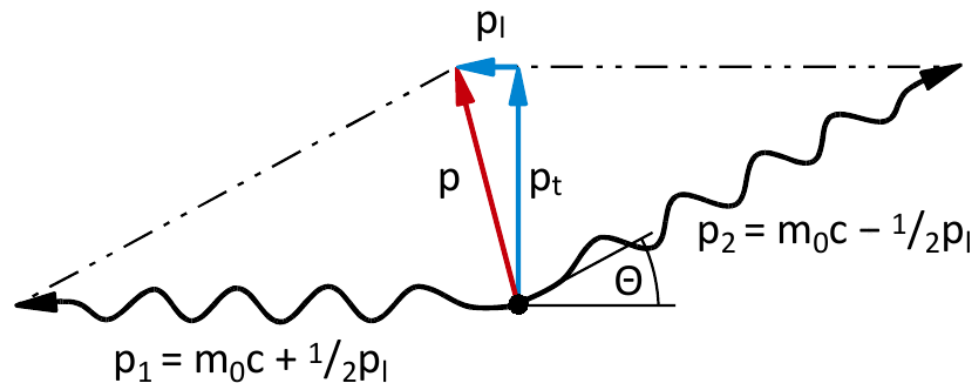
# Messungen mit gepixelten Germaniumdetektoren an Quarz

DPG, Dresden, 31. März 2014

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# Motivation



- Measure longitudinal and transverse momentum:  
angular deviation and energy  
→ Full electron momentum information

# Pixelated germanium detector

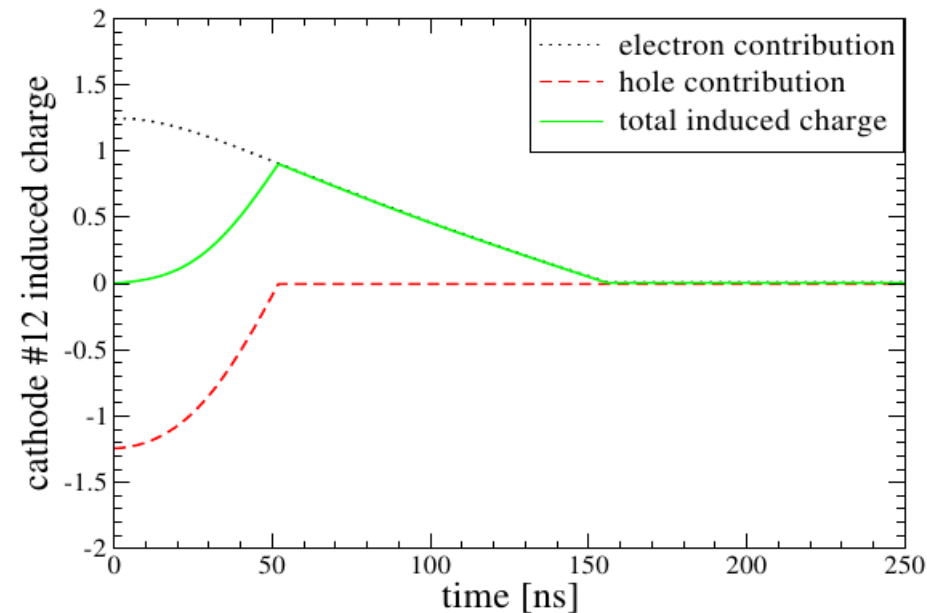
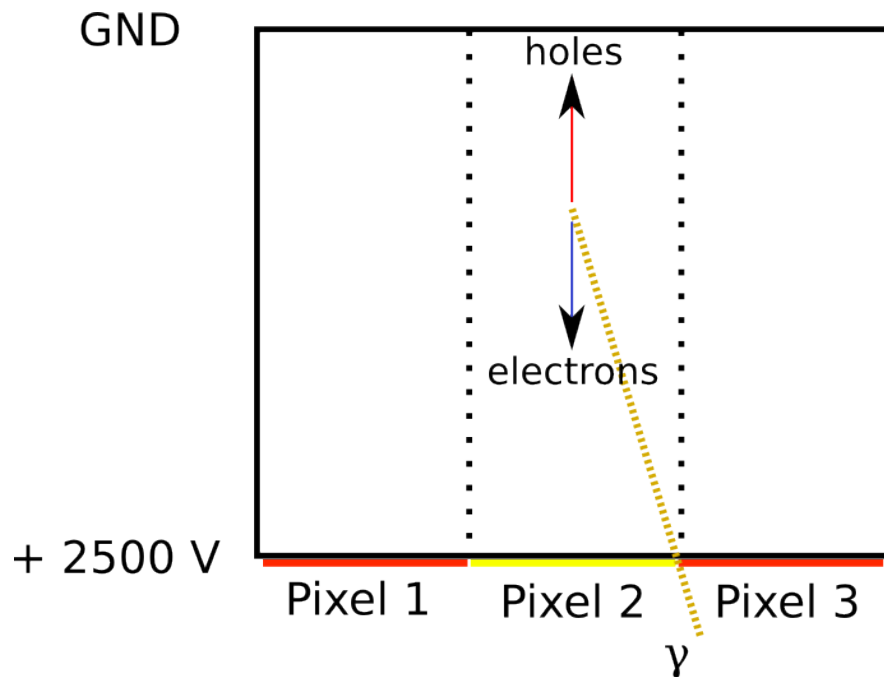
(Canberra EGPS 48\*48\*20-36 PIX)

- 6 x 6 pixels @ 8 x 8 mm  
+ full volume contact  
(= 37 outputs)
- Energy resolution:  
~ 1.35 keV @ 662 keV

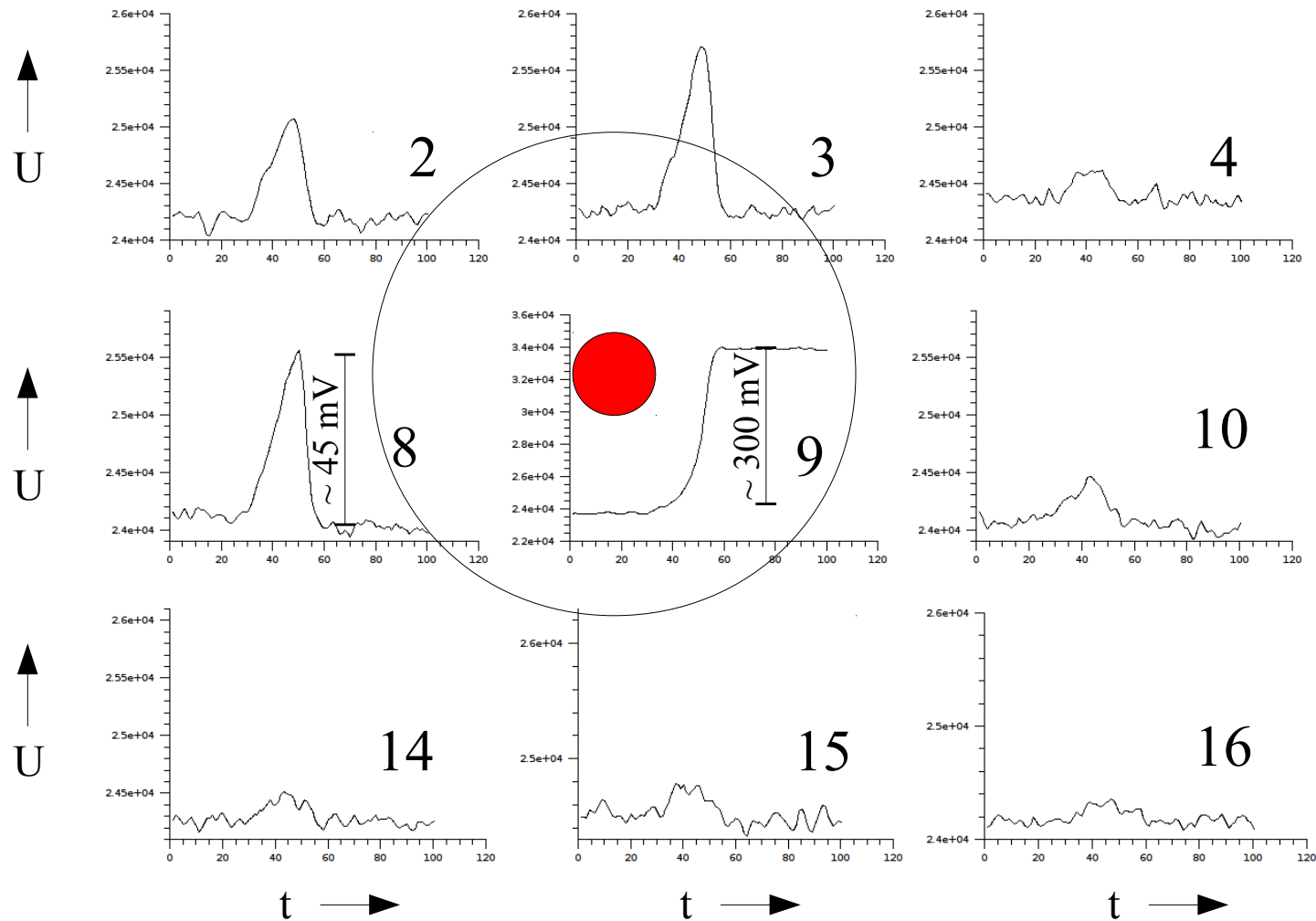


# Induced charges

- Induced charges in neighboring pixels during charge transport
- Signal form depends on distance to absorption location



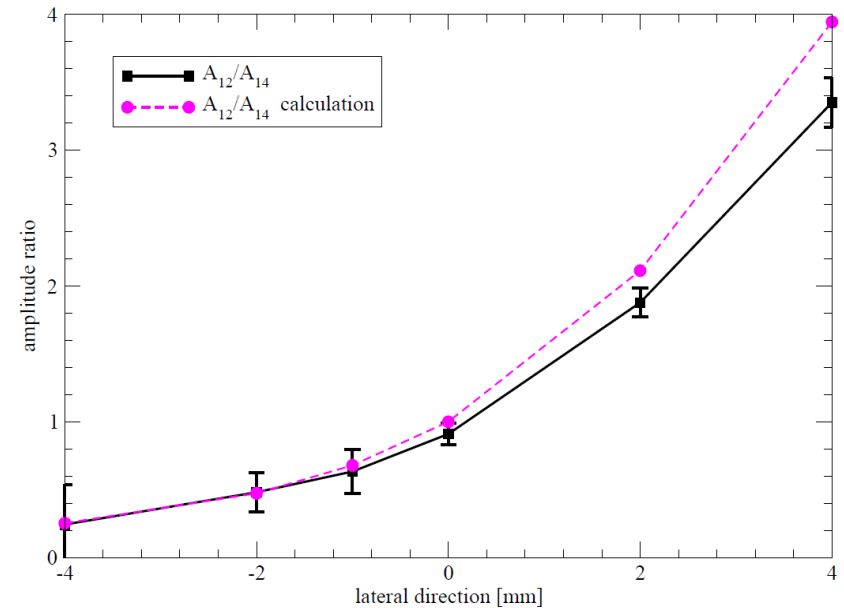
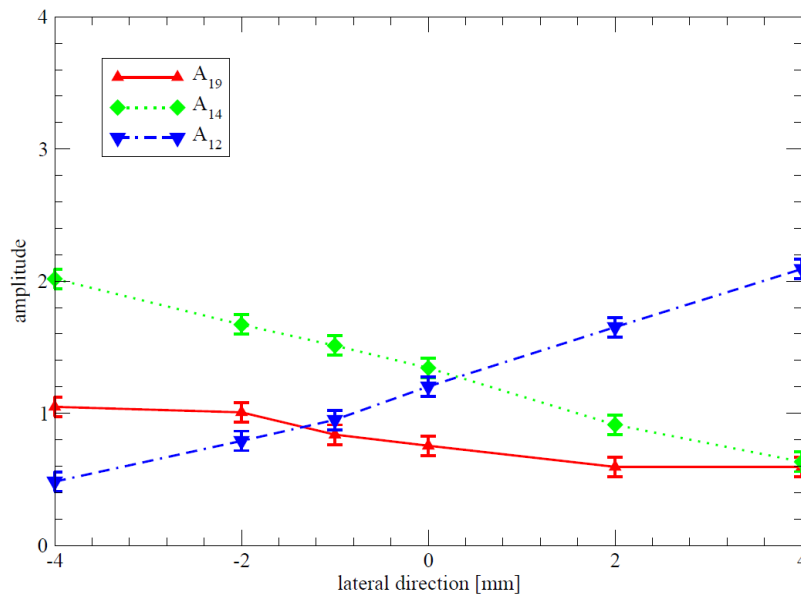
L. Milechina, Doctoral Thesis,  
KTH, 2004, p. 78



- gamma in pixel 9
- induced charges in neighboring pixels

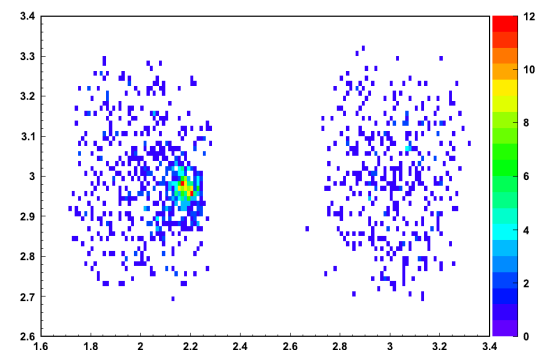
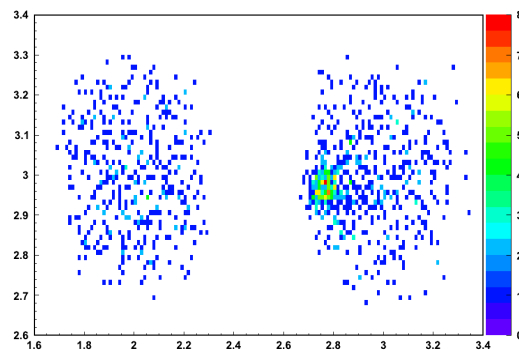
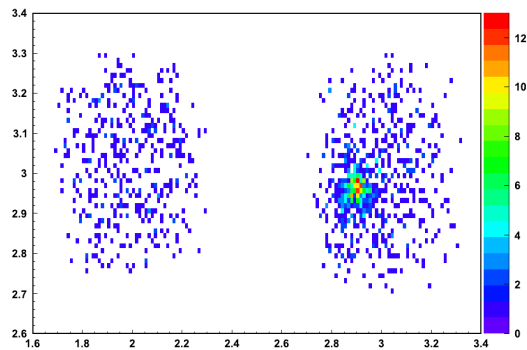
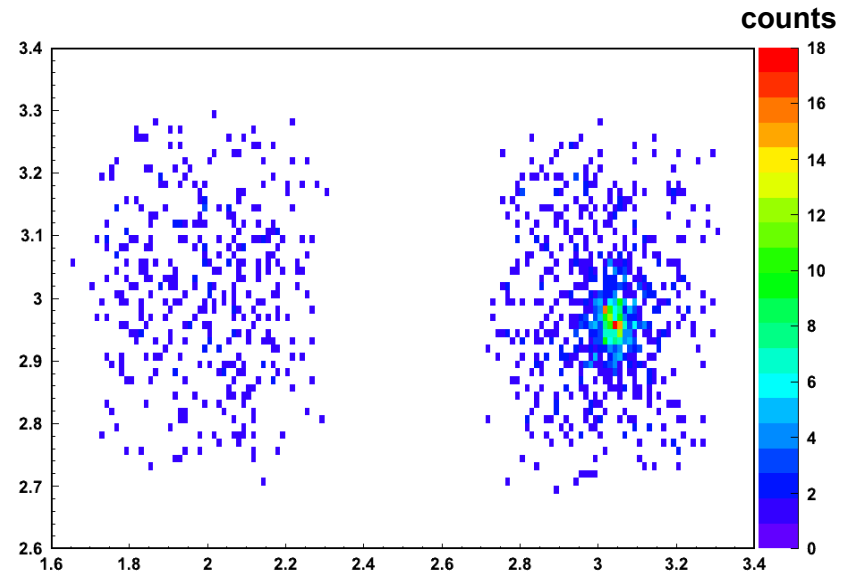
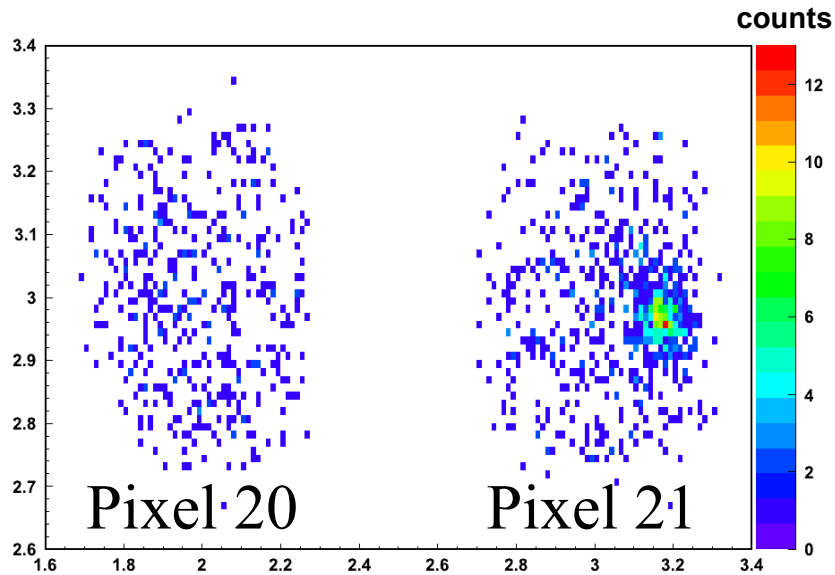
# Analysis of induced charges

(L. Milechina, Doctoral Thesis, KTH, 2004)

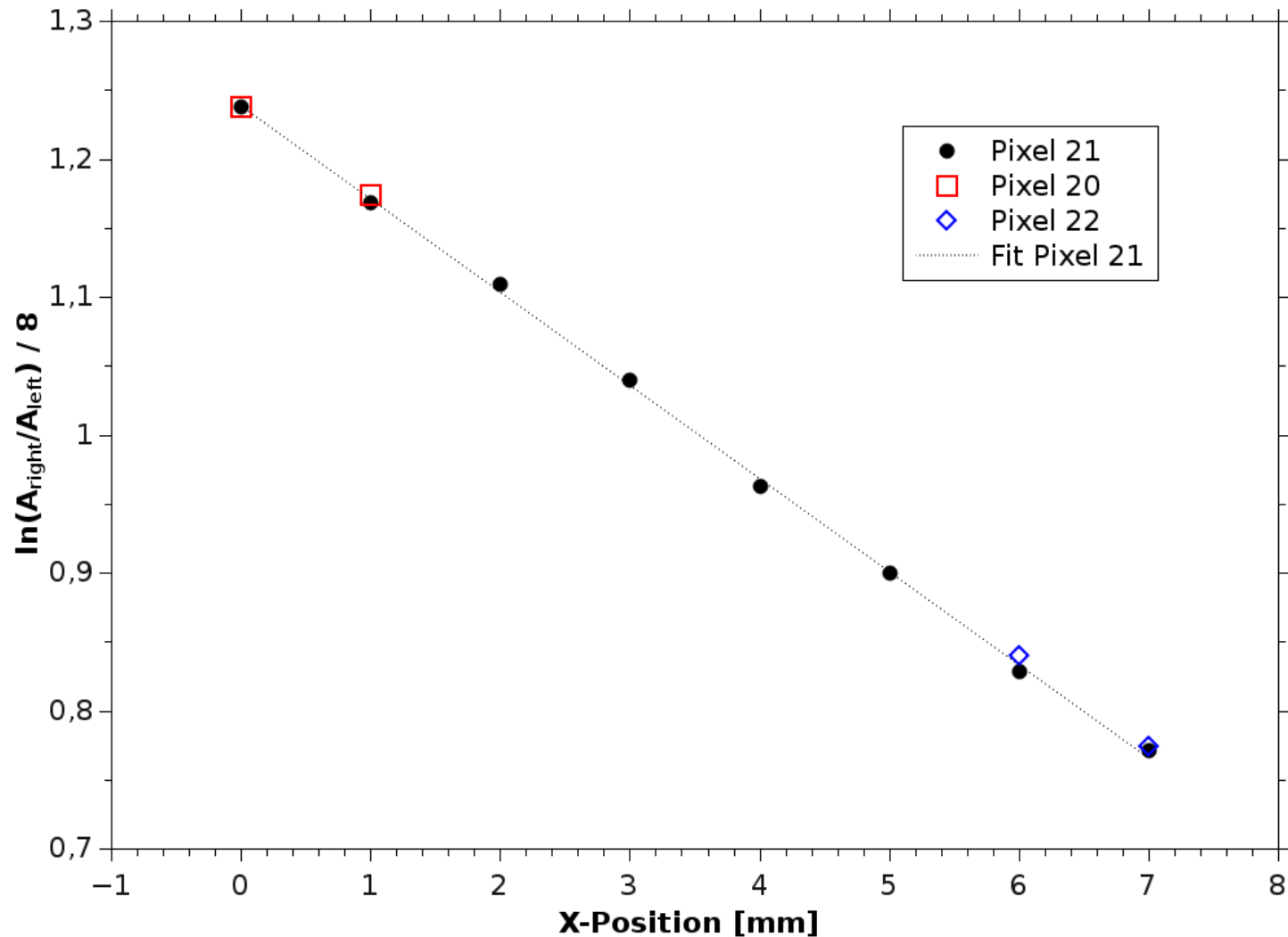


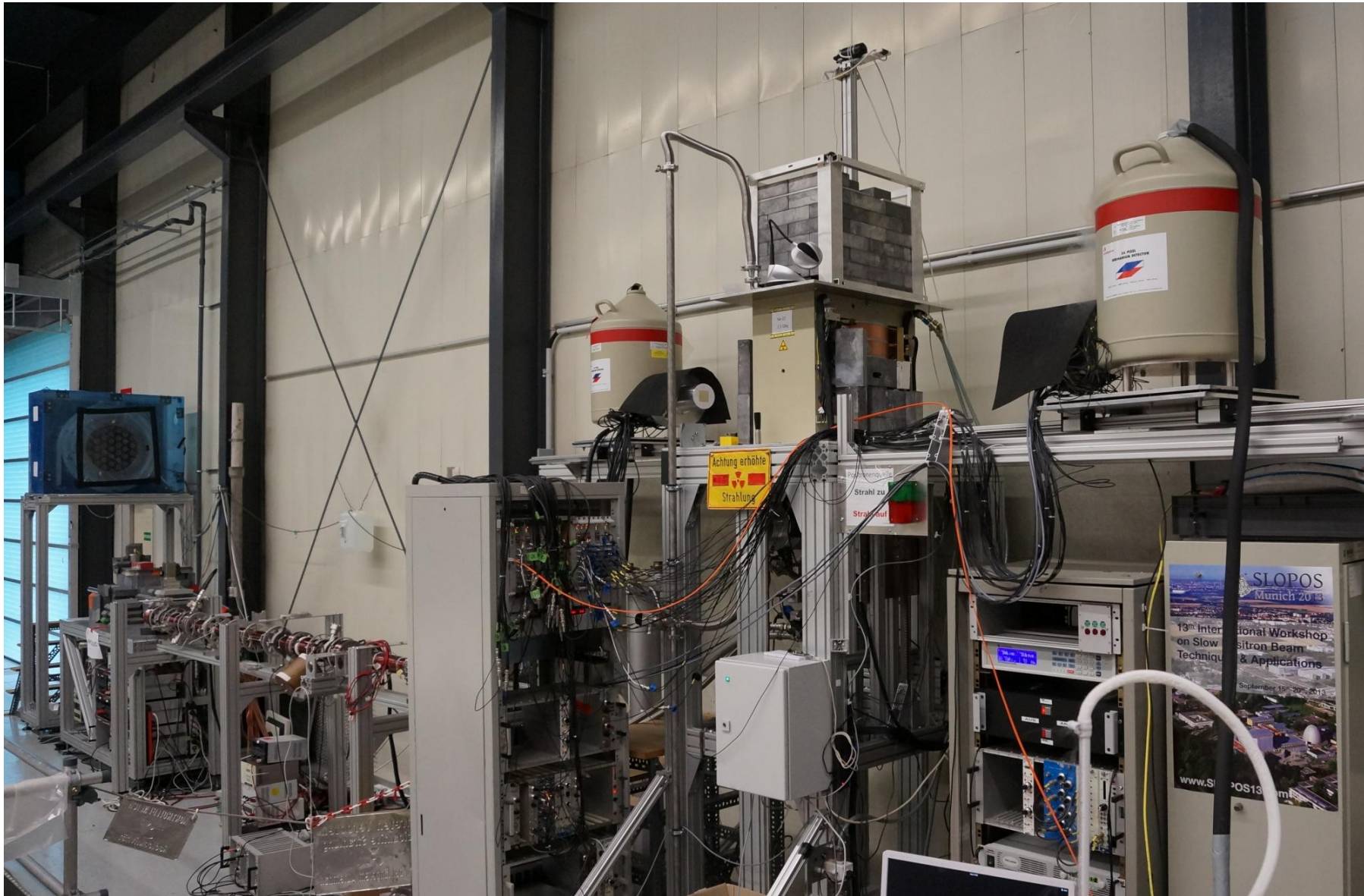
- Maximum of induced charge vs. x-position (depth: 2 mm)
- $\exp(k \cdot x) \sim A_{12}/A_{14}$   
 $\rightarrow \log(A_{12}/A_{14}) \sim \text{position}$

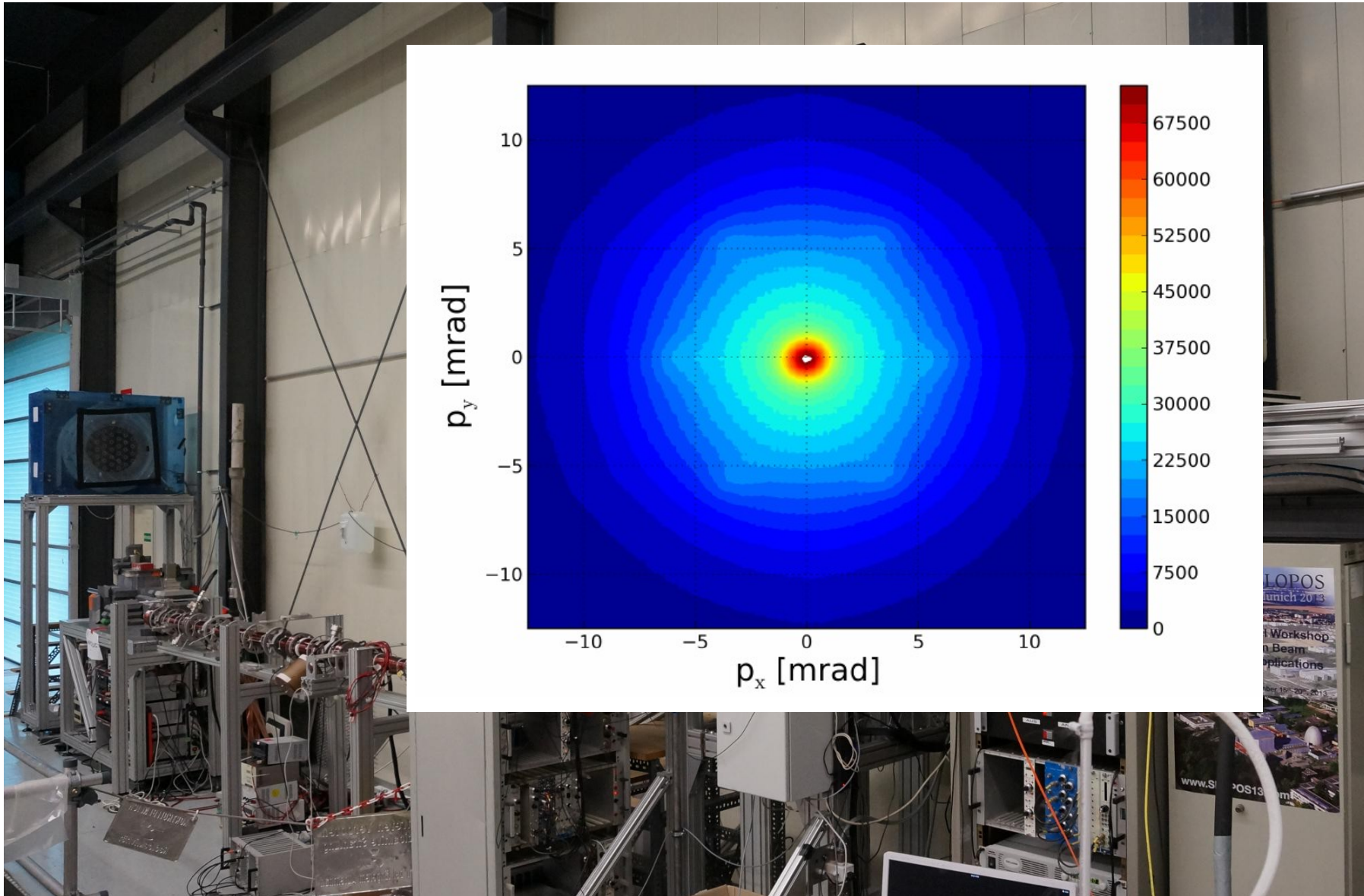
# X-scan, step size 2 mm



# Position calibration

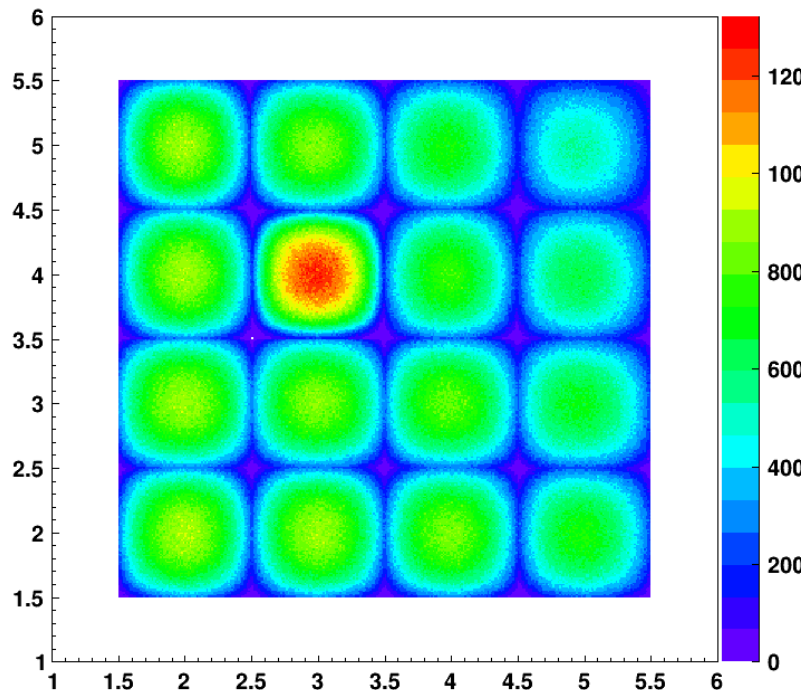




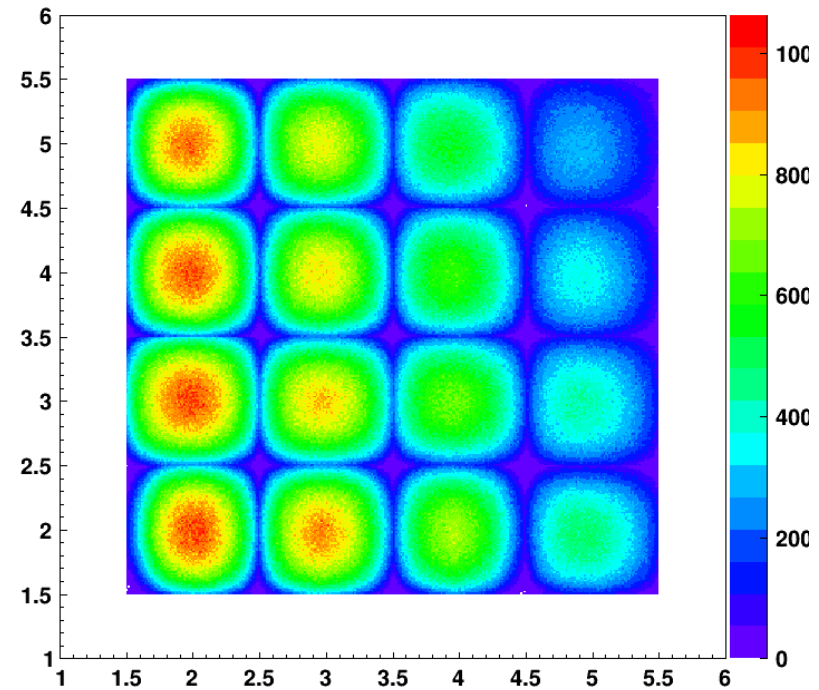


# Single Detector Images

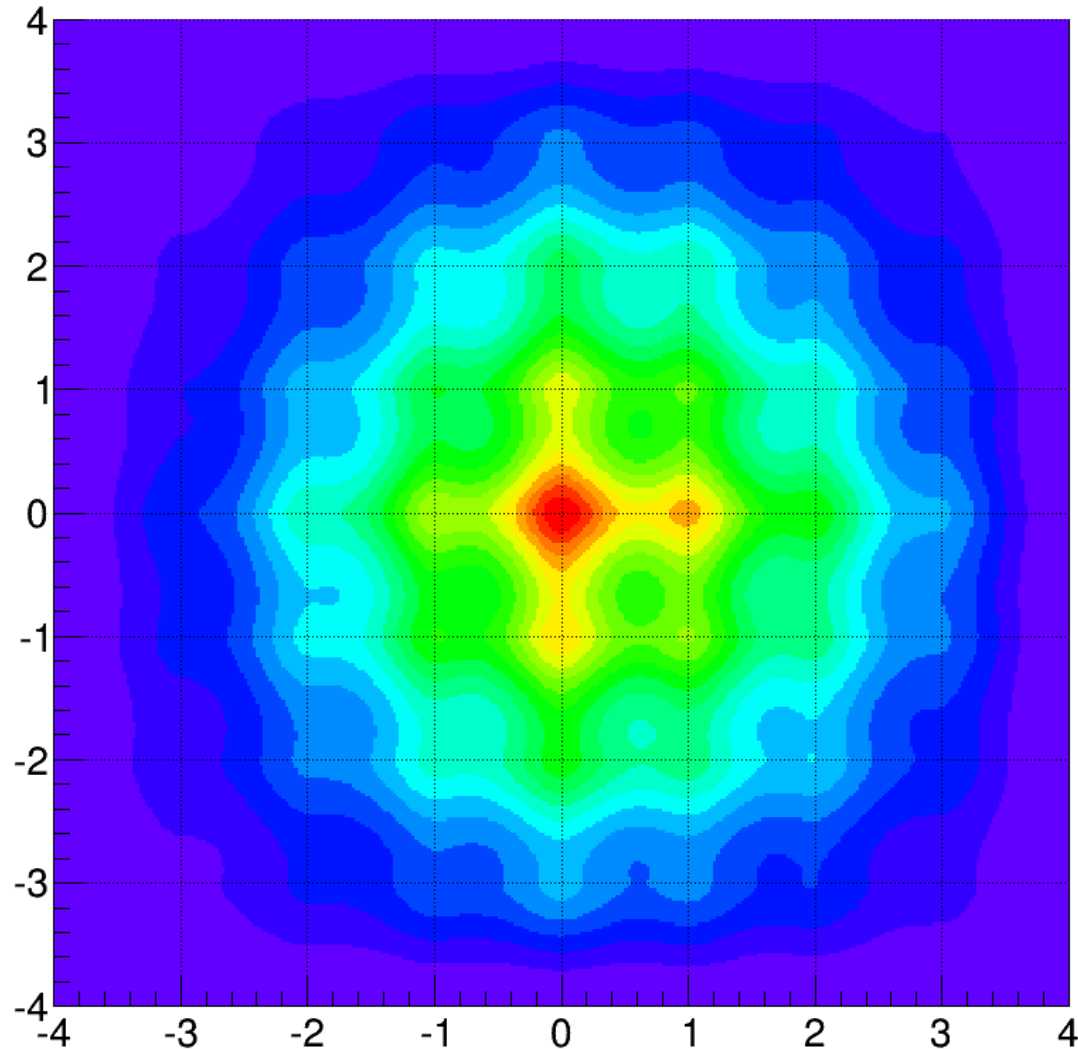
Detector 1



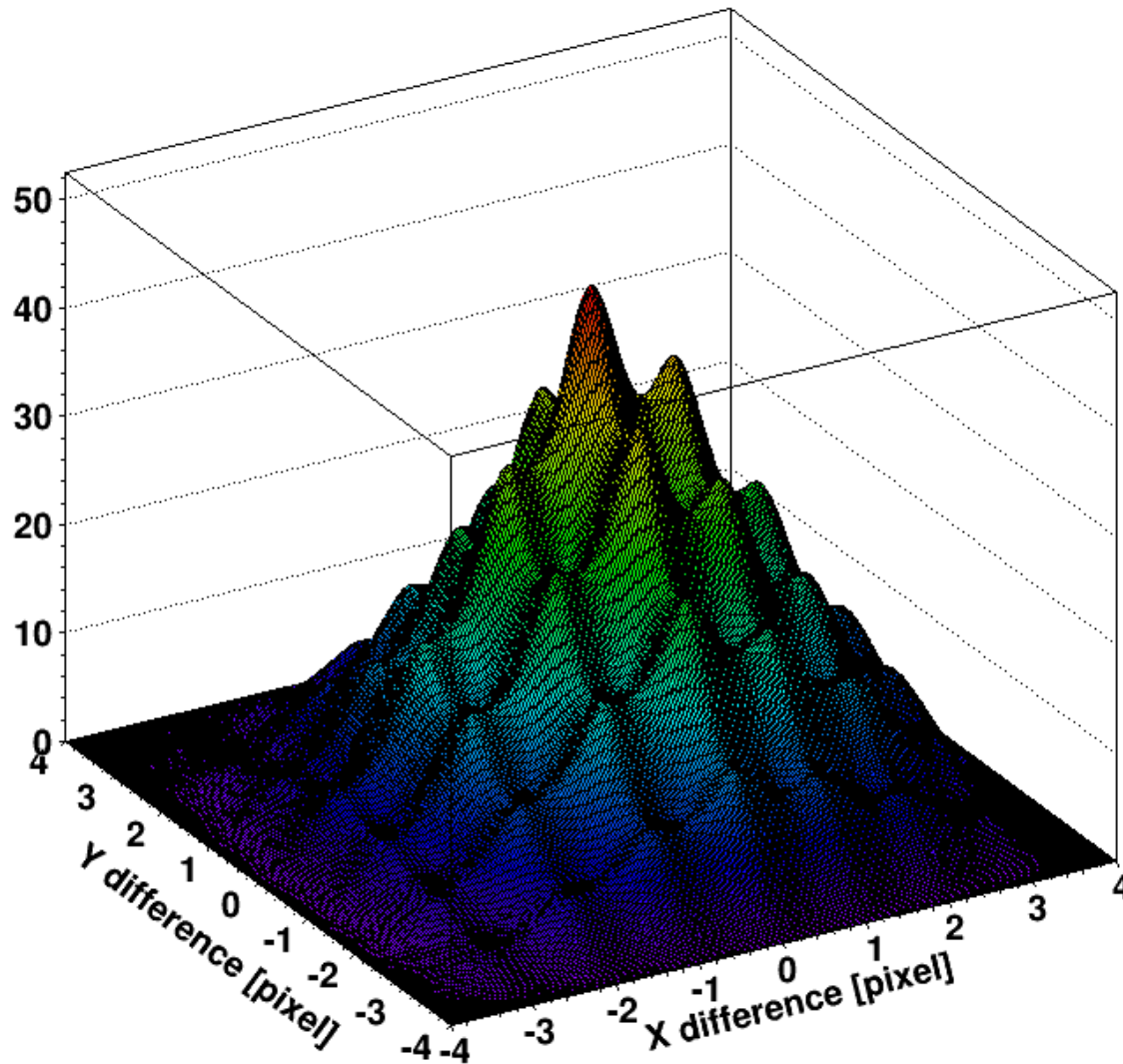
Detector 2



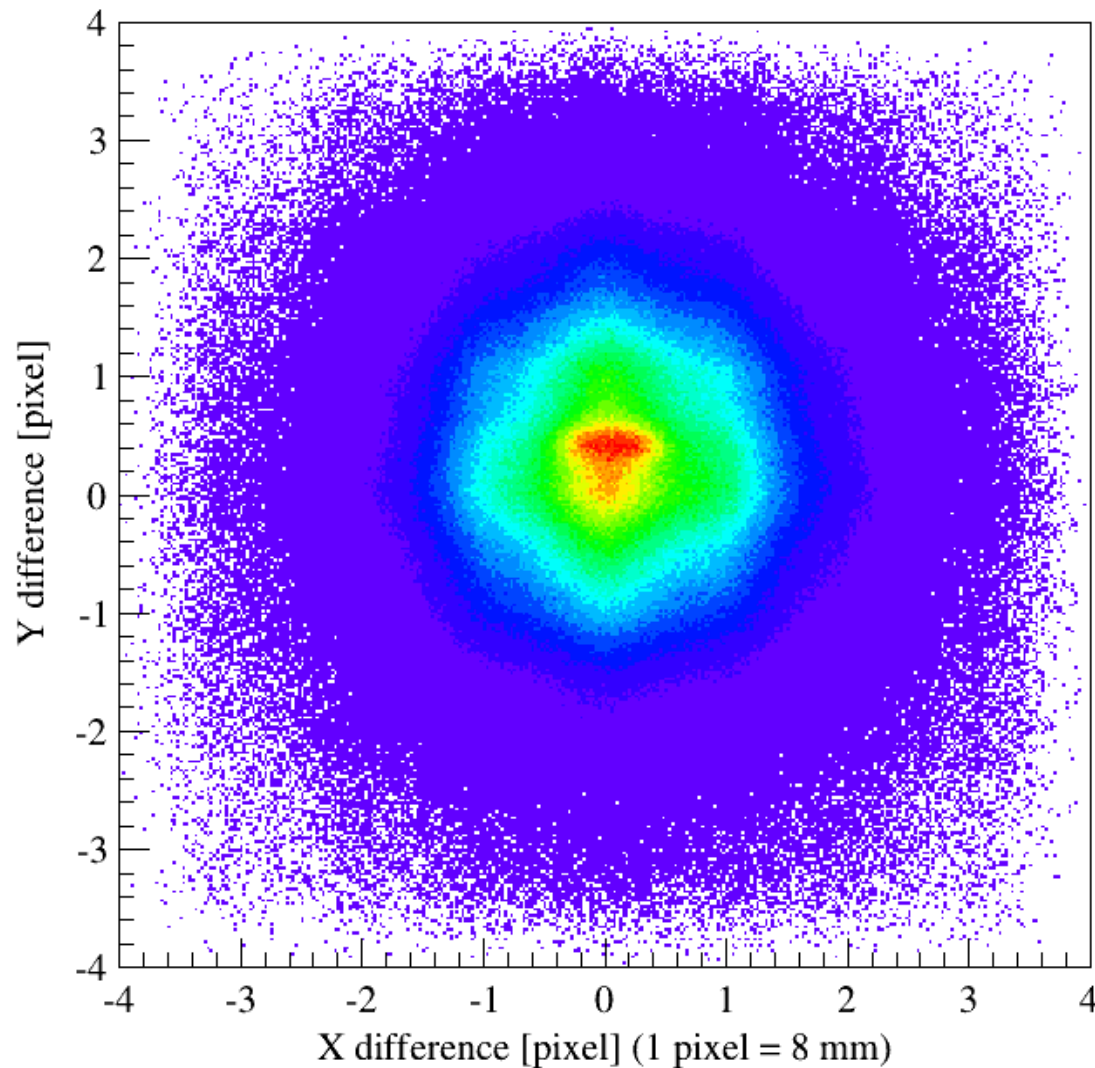
# Momentum Sampling Function



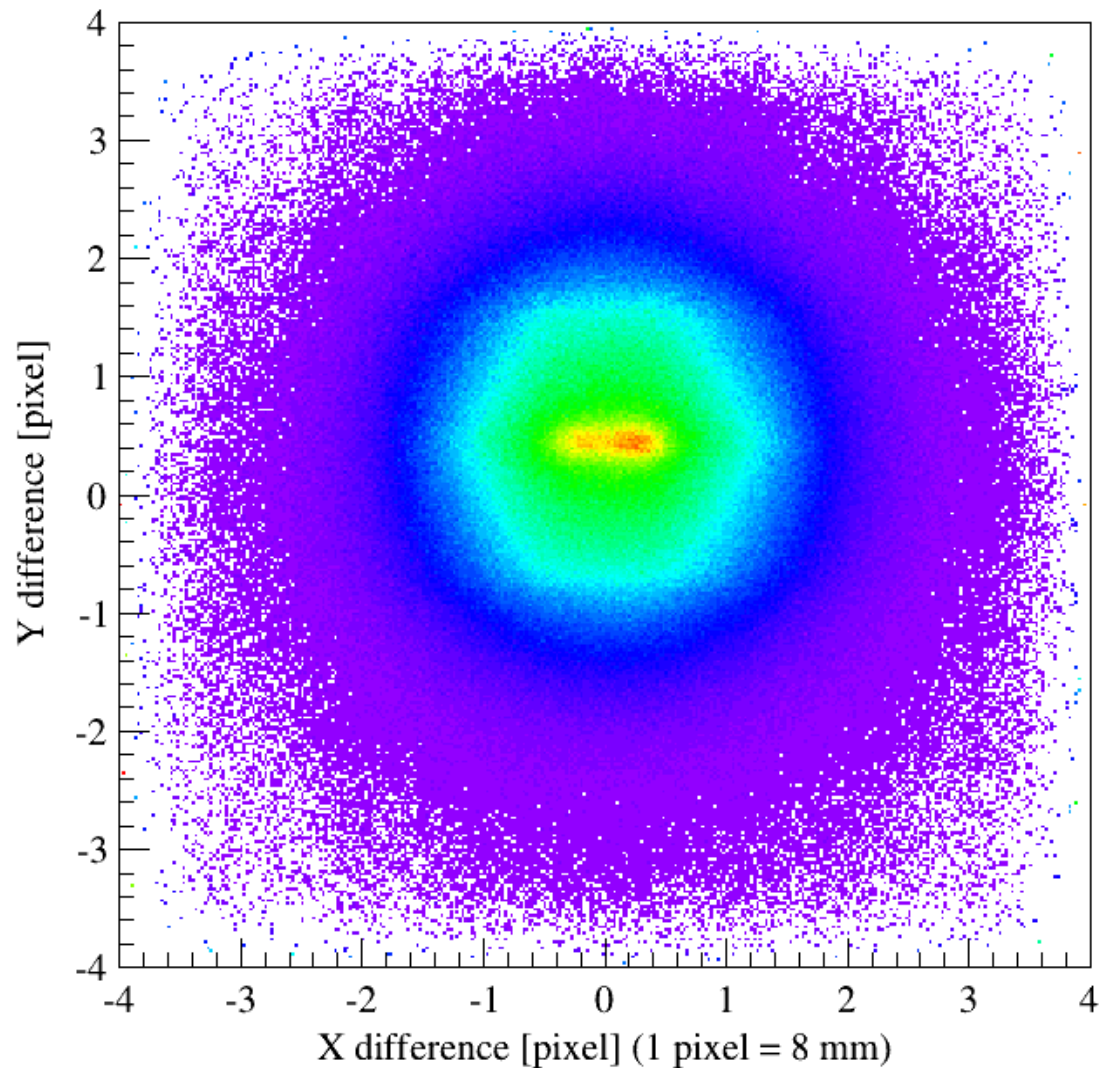
# Momentum Sampling Function



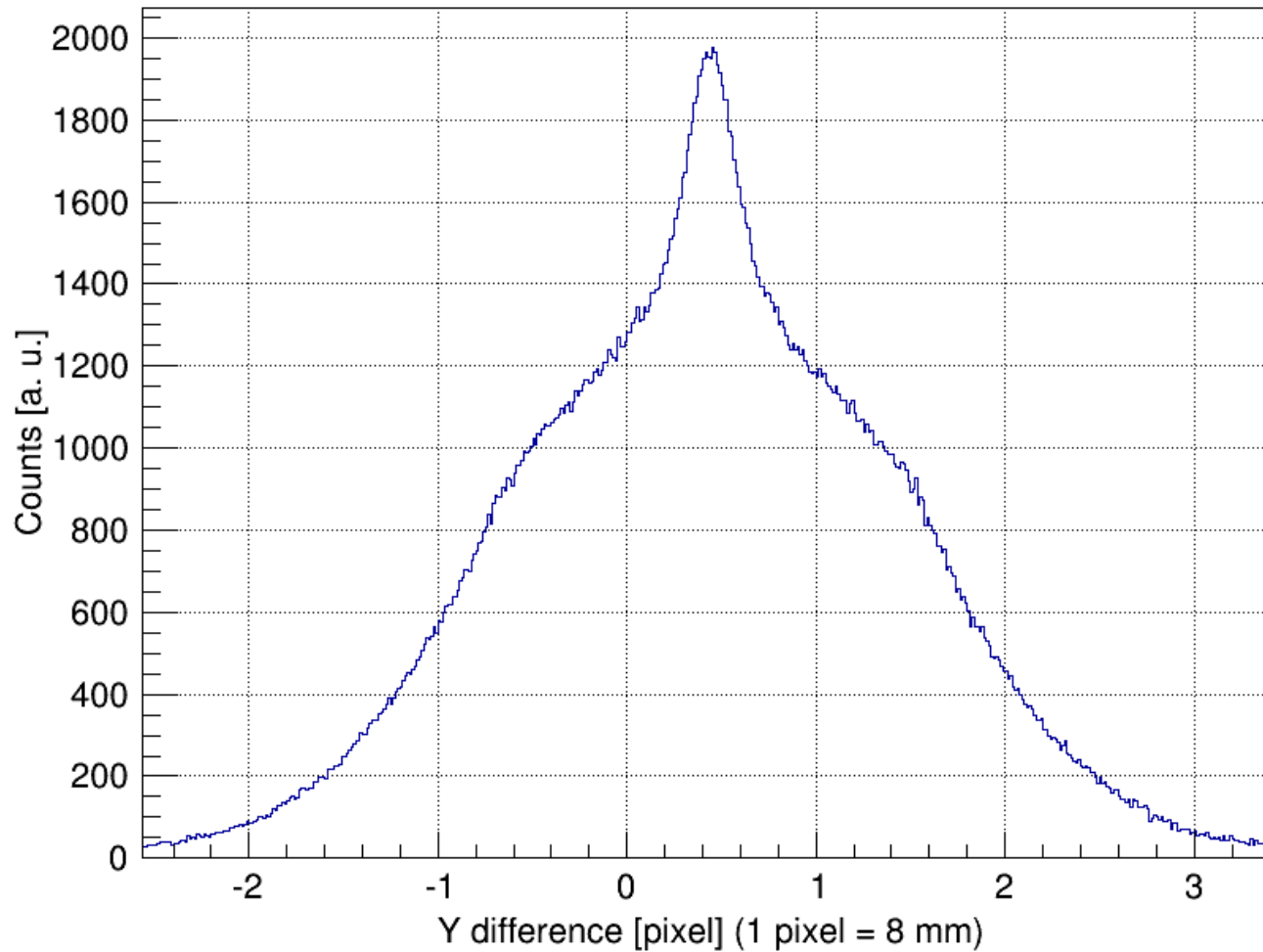
# ACAR Raw Spectrum



# ACAR Spectrum

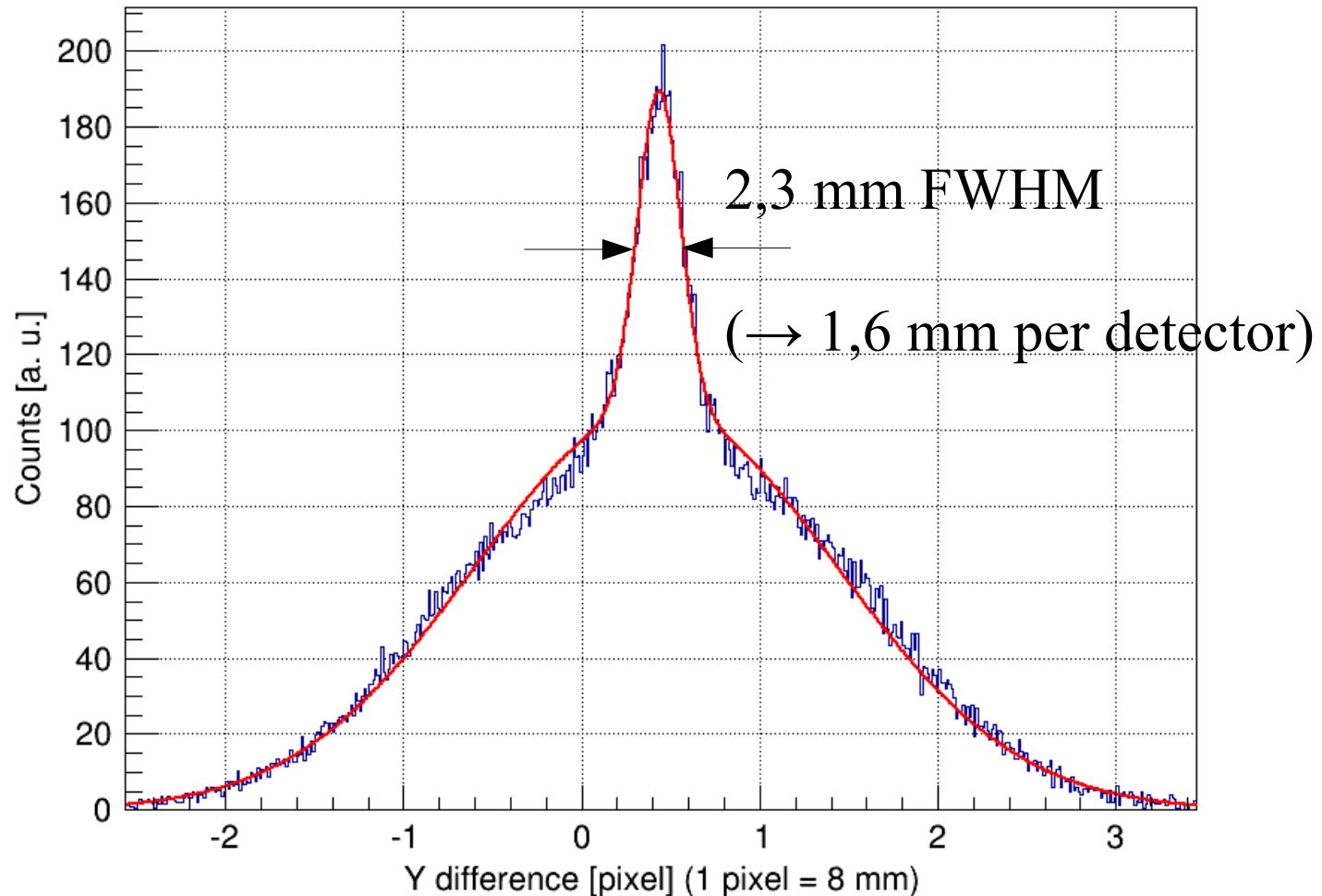


# Y-Projection

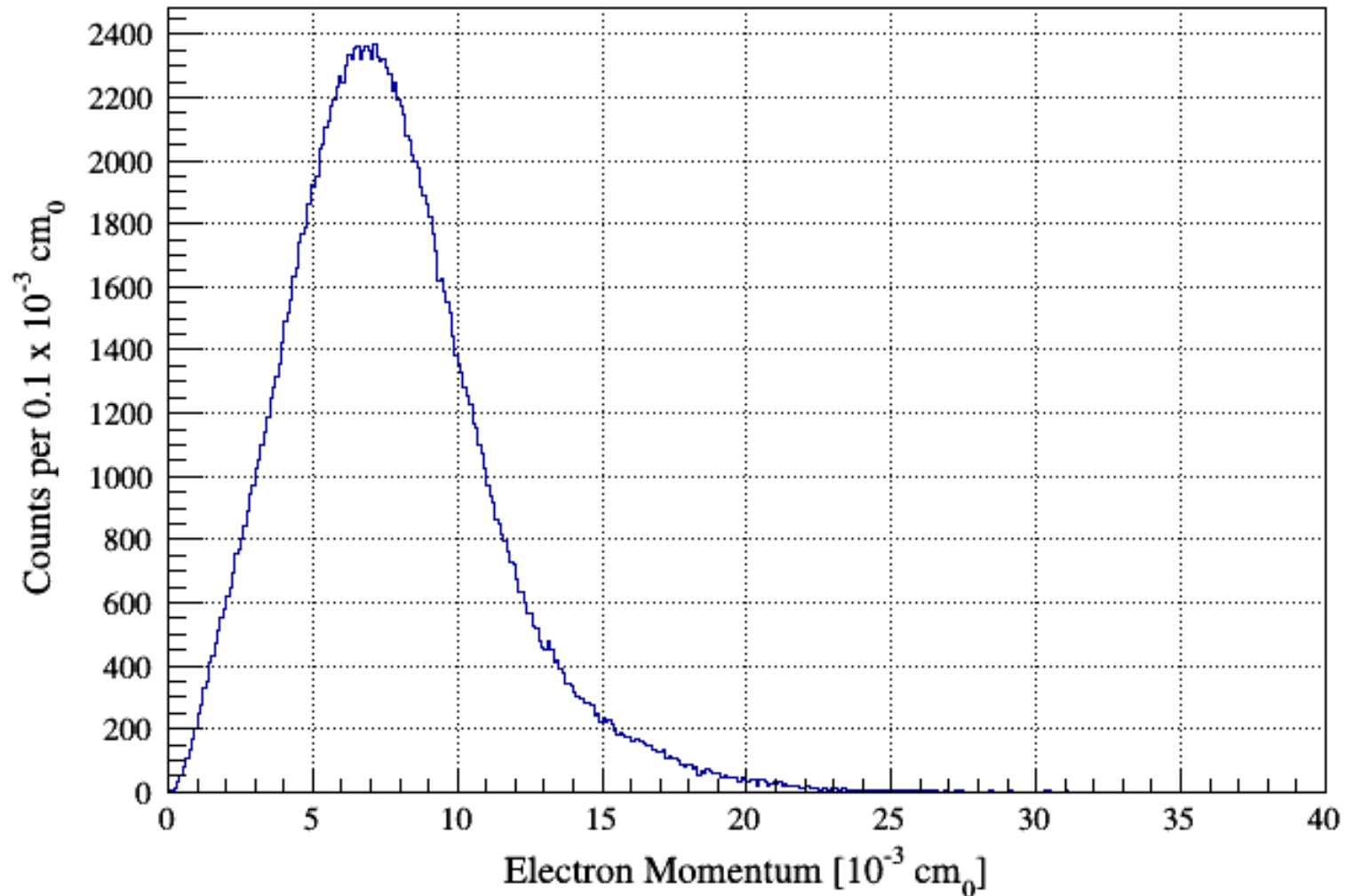


# Y-Projection

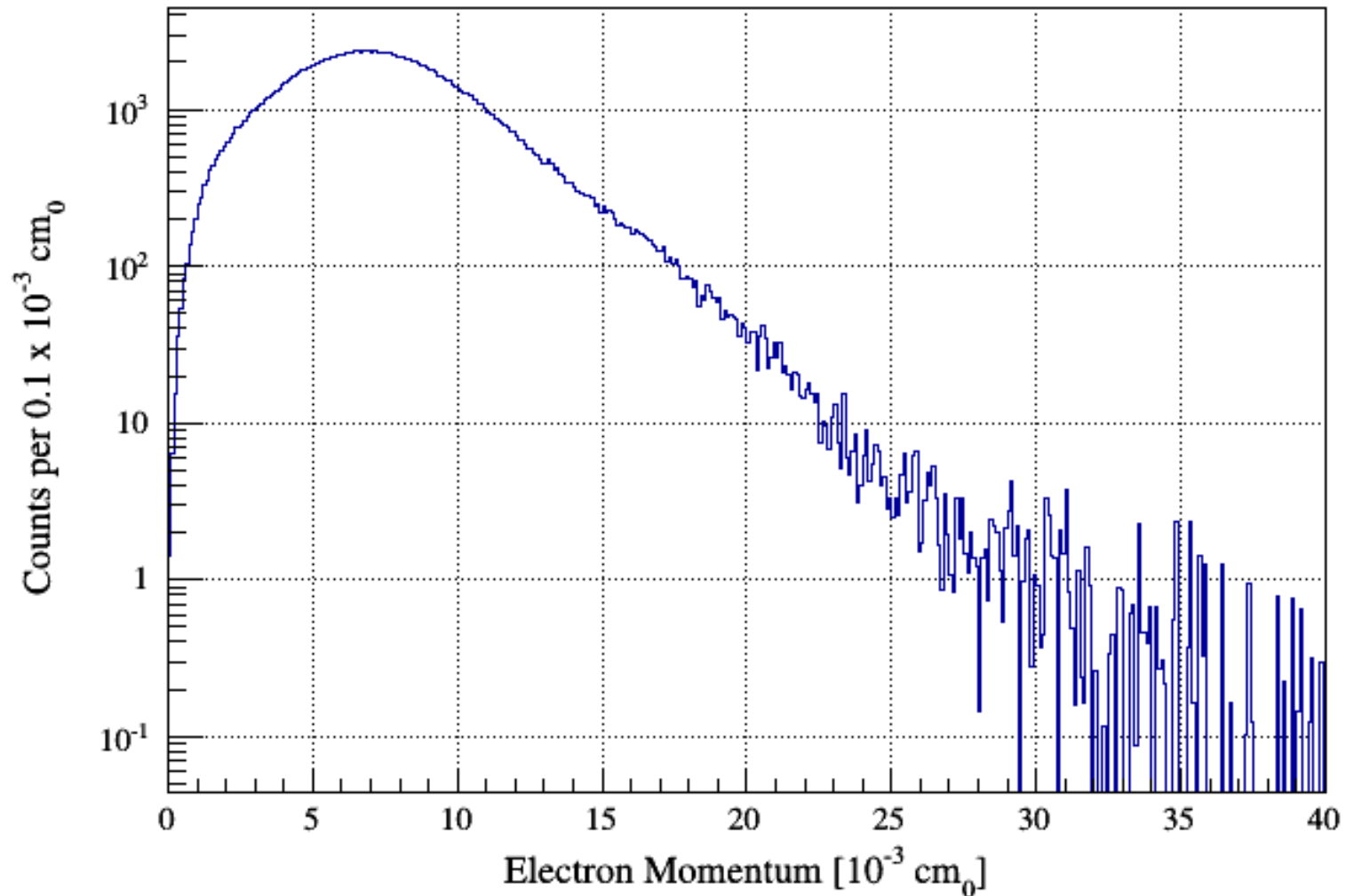
$E = 511 \text{ keV} \pm 0,5 \text{ keV}$



# Electron Momentum



# Electron Momentum



# Conclusion

- Position resolution good enough for 3D momentum measurements

## Outlook:

- High momentum measurements at smaller distance (Fe currently running)
- Smaller beam spot (NEPOMUC?)

Thank you for your attention!