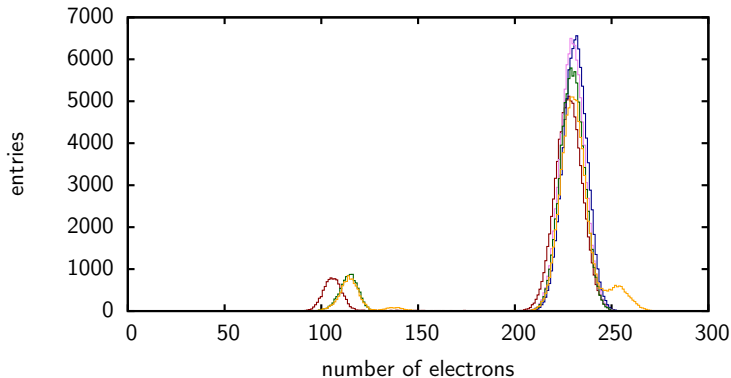


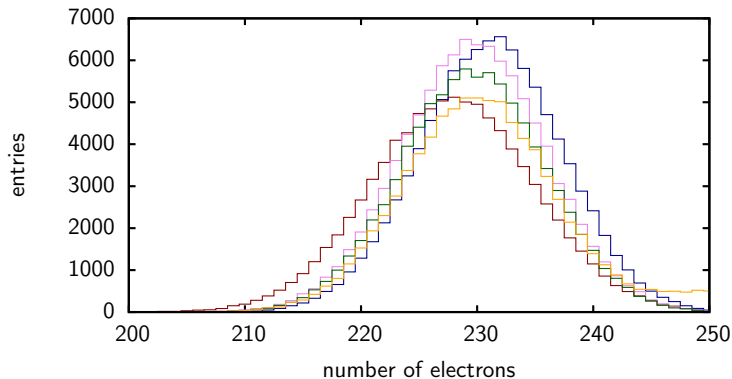
- Heed
 - Photoabsorption of 5.9 keV photon, atomic relaxation, transport of photoelectrons and Auger electrons
 - Conversion at $(x, y) = (0, 0)$
 - Bounding box:
 $-2 \text{ cm} < x < 2 \text{ cm}, -2 \text{ cm} < y < 2 \text{ cm}, 0 \text{ cm} < x < 2.3 \text{ cm}$
- Magboltz
 - 5.9 keV photo electron
 - absorption of 5.9 keV photon, relaxation cascade (probabilities from EADL database)

Primary Electrons



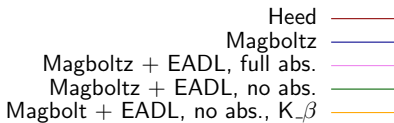
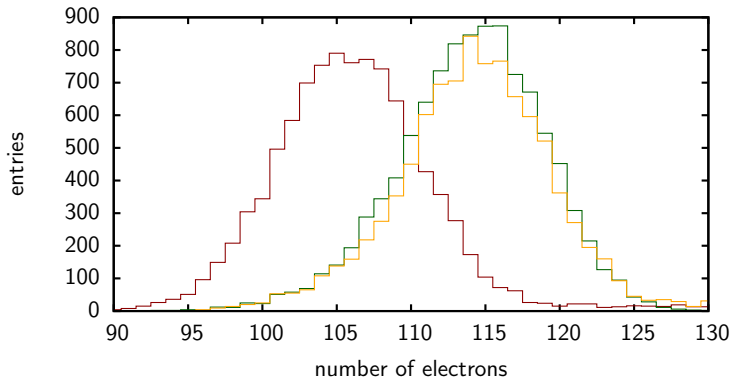
- Heed
- Magboltz
- Magboltz + EADL, full abs.
- Magboltz + EADL, no abs.
- Magboltz + EADL, no abs., K β

Primary Electrons



Heed ———
Magboltz ———
Magboltz + EADL, full abs. ———
Magboltz + EADL, no abs. ———
Magboltz + EADL, no abs., K_{β} ———

Primary Electrons



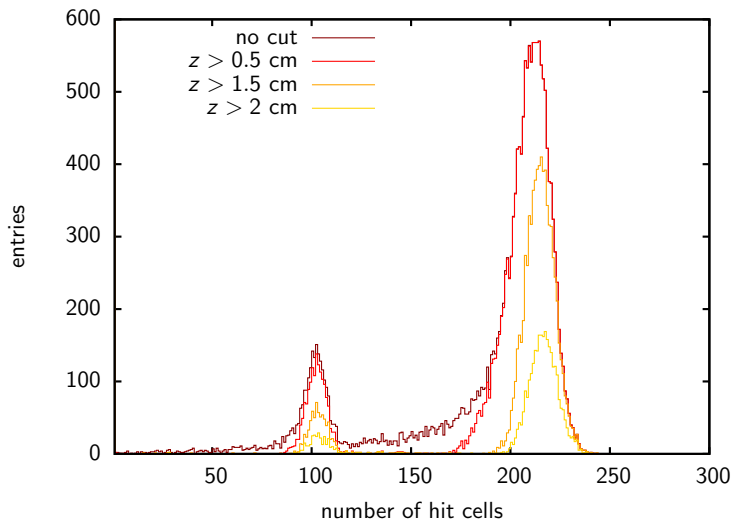
Fits:

- Photopeak
 - Heed: 228.4
 - Magboltz: 229.7 - 230.1
- Escape-Peak
 - Heed: 106.3
 - Magboltz: 114.8

Electrons at Mesh

- Primary electrons created by Heed
- Drift primary electrons in uniform field (700 V/cm)
- Practically all electrons arrive at mesh
- Electrons arriving at the same $55 \mu\text{m} \times 55 \mu\text{m}$ cell only counted once
- 100% transparency
- 3×10^4 tracks

Electrons at Mesh

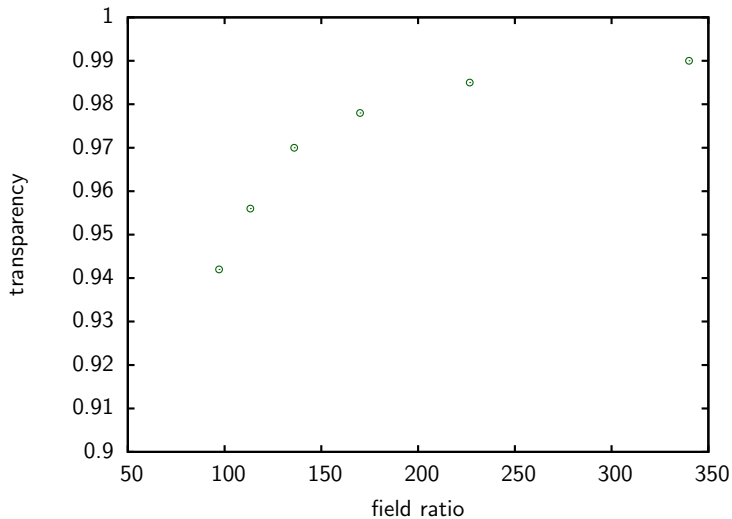


Fits

cut	photo peak	escape peak
$z > 0.0$ cm	211.064	102.607
$z > 0.5$ cm	210.708	103.277
$z > 1.0$ cm	213.689	104.034
$z > 1.5$ cm	215.921	104.521
$z > 2.0$ cm	217.518	104.719

- Mesh dimensions: hole diameter 31 mm, thickness 2 μm
- Electrons started at $\approx 100\mu\text{m}$ above the mesh
- Tracking in field map imported from Ansys
- $V_{\text{mesh}} = -340 \text{ V}$

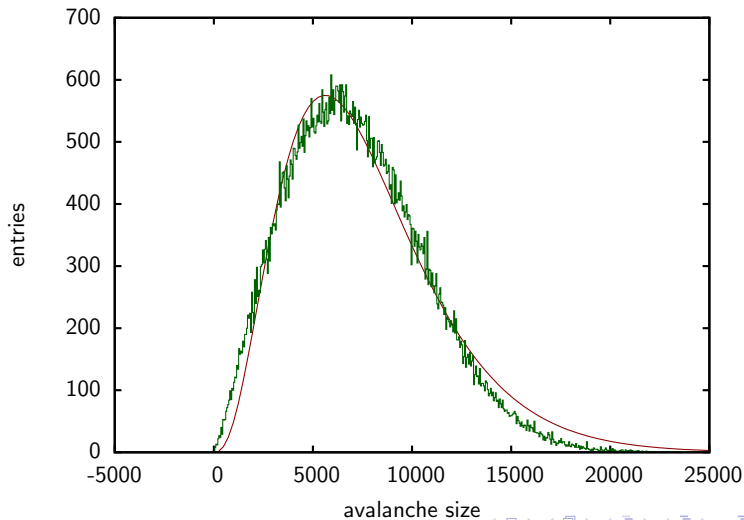
Transparency



- Uniform field
- 10^5 runs per mesh voltage
- Simple Penning transfer model:
 - all excitation levels of Ar produce ionisation electron with probability $p = 0.4$
 - secondary electron (energy 1 eV) created on the spot, no time delay

Gain Spectra

- $V_{\text{mesh}} = -340 \text{ V}$

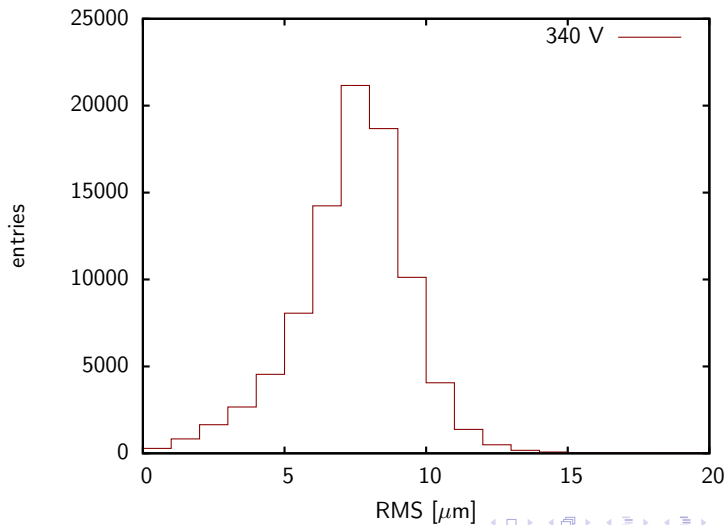


Fits

V_{mesh}	θ (without Penning)	θ (with Penning)
300	1.07	2.34
310	1.11	
320	1.13	2.50
330	1.40	2.59
340	1.22	2.70

Gain Spectra

- $V_{\text{mesh}} = -340 \text{ V}$





$$P(n, x) = \frac{1}{\bar{n}} \frac{(\theta + 1)^{\theta+1}}{\Gamma(\theta + 1)} \left(\frac{n}{\bar{n}}\right)^\theta e^{-(\theta+1)n/\bar{n}}$$

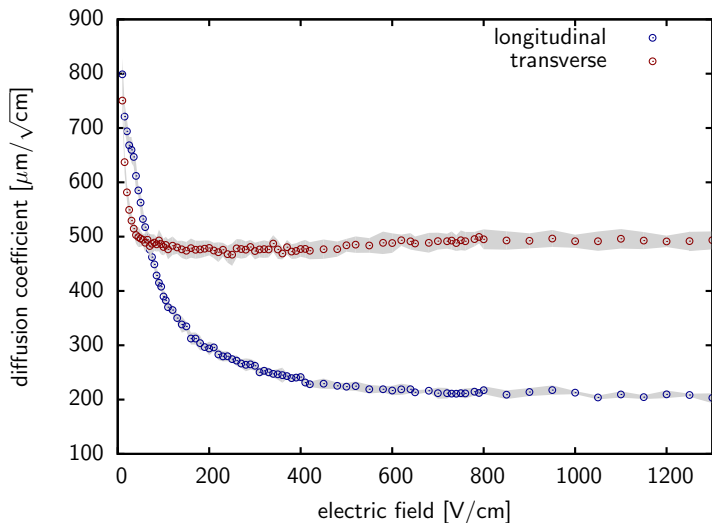
- width

$$\frac{\sigma^2}{\bar{n}^2} \approx \frac{1}{1 + \theta}$$

- maximum $n_{\max} = \bar{n}\theta / (\theta + 1)$
- efficiency

$$\eta = \frac{\Gamma(\theta + 1, (\theta + 1) \frac{n_T}{\bar{n}})}{\Gamma(\theta + 1)}$$

Diffusion (Magboltz)



Gain (Magboltz)

