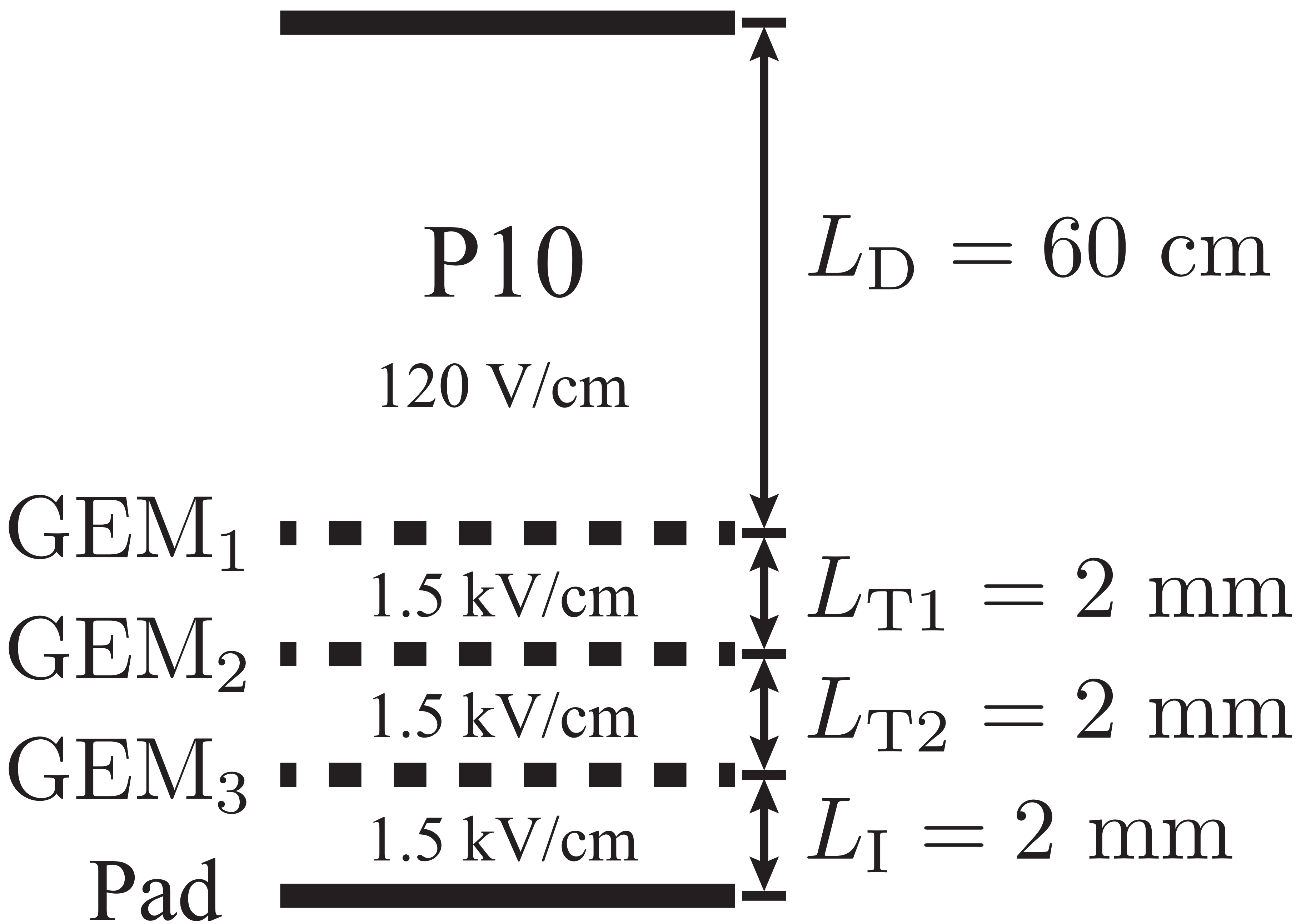
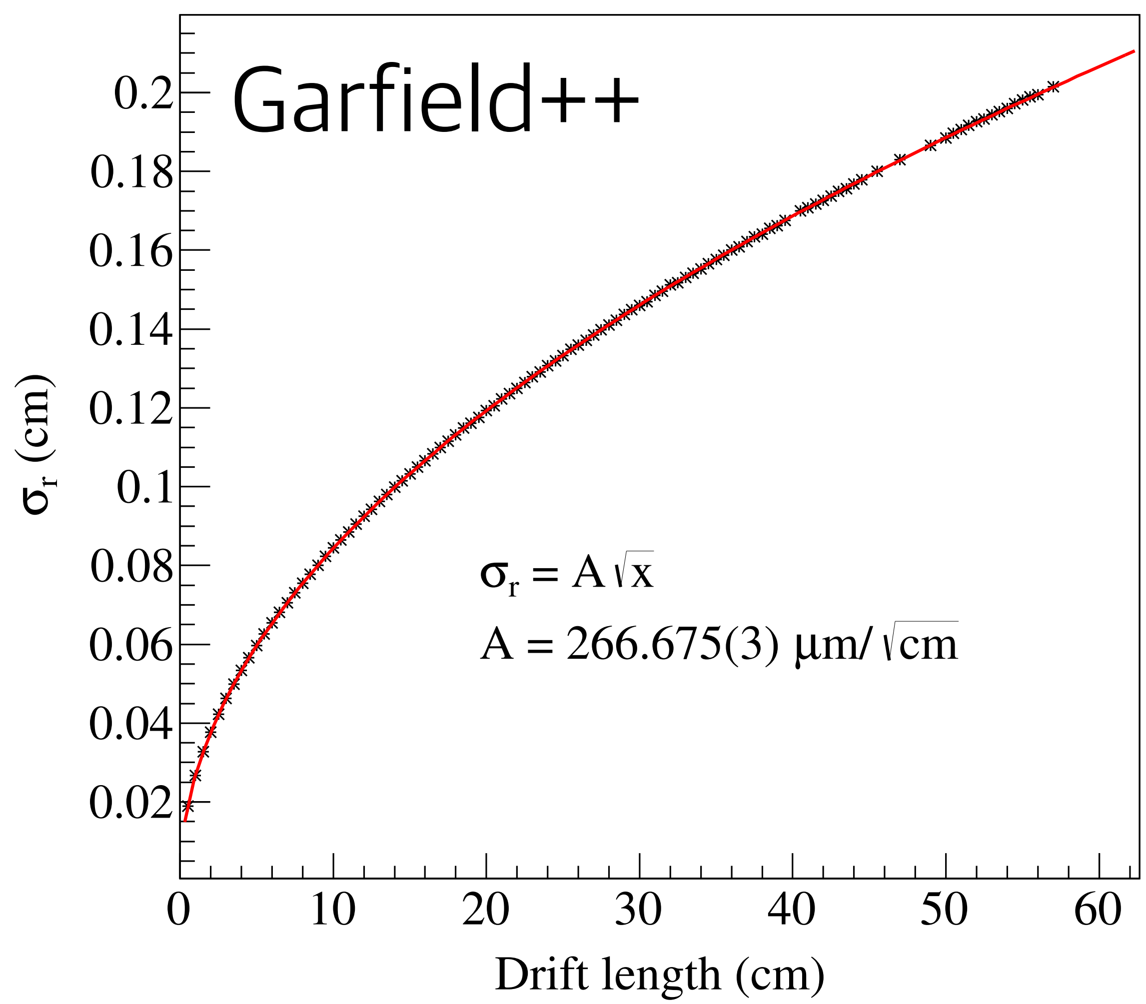
Detector schematic

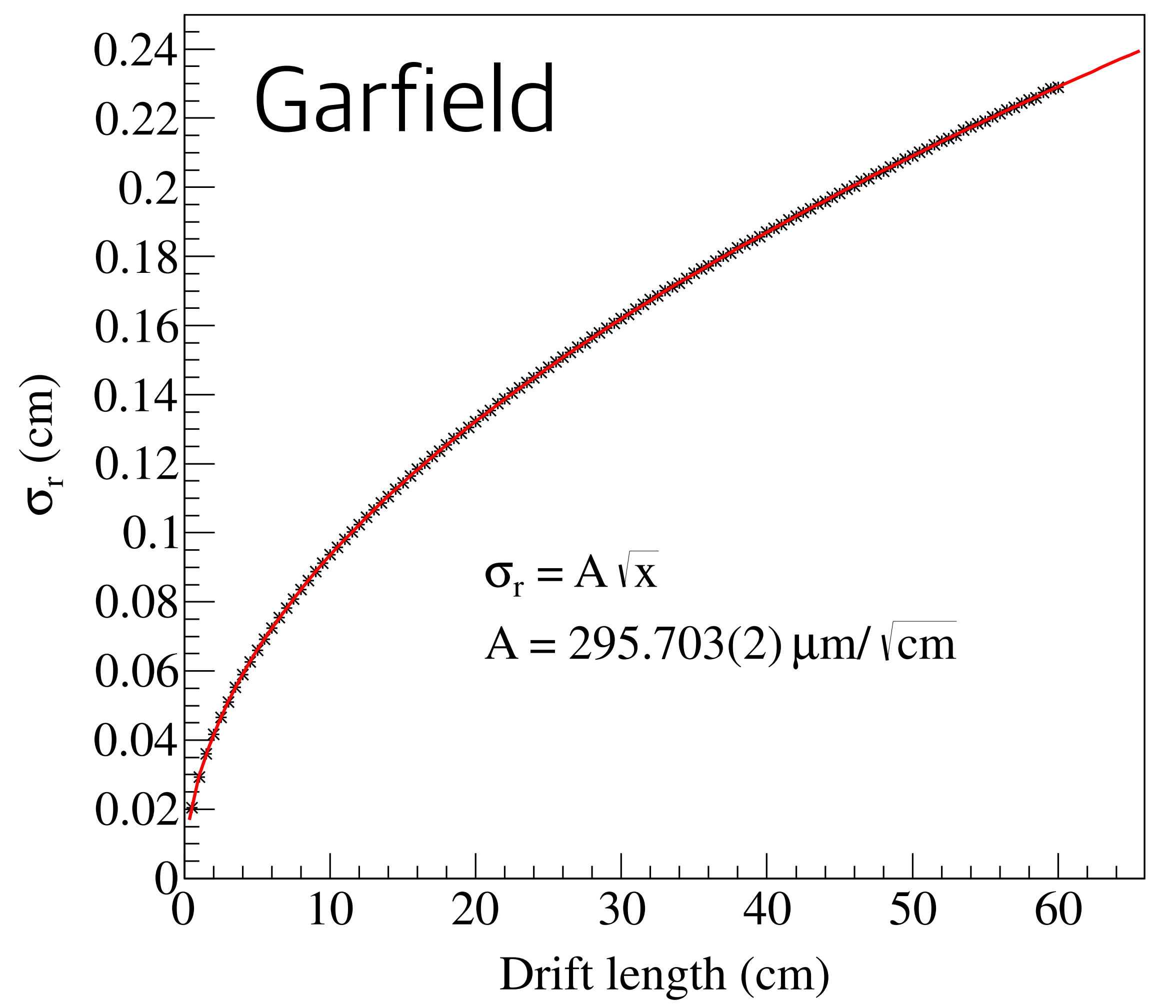


All $\Delta V_{\mathrm{GEM}} = 350$V

Drift space simulation – Transverse diffusion

Magboltz2: $\sigma_{\mathrm{T}} = 206.91\ \mu\mathrm{m}/\sqrt{\mathrm{cm}}$





- All values are different.
- The difference appears when dealing with the magnetic field.

Rob Veenhof 2015년 3월 29일 오전 1:08

받는 사람: Genie Jhang

Re: Question on diffusion using garfieldpp

VR

> So, you're saying that when Garfield++ is running in microscopic tracking mode, it doesn't use the transport properties.

That's right - it takes the cross sections from Magboltz and then tracks the electrons using an algorithm that is largeoly inspired by Magboltz.

Garfield used (and still uses) the actual Magboltz tracking algoritm with minimal changes for the field - but Garfield++ uses a C++ version. Heinrich can tell you all about that.

> Since I'm running Garfield++ using AvalancheMC class, it refers the values, right?

Avalanche MC should not be used at all for electrons - this is obsolete and replaced my microscopic tracking. The NC algorithm was badly inaccurate for B fields:

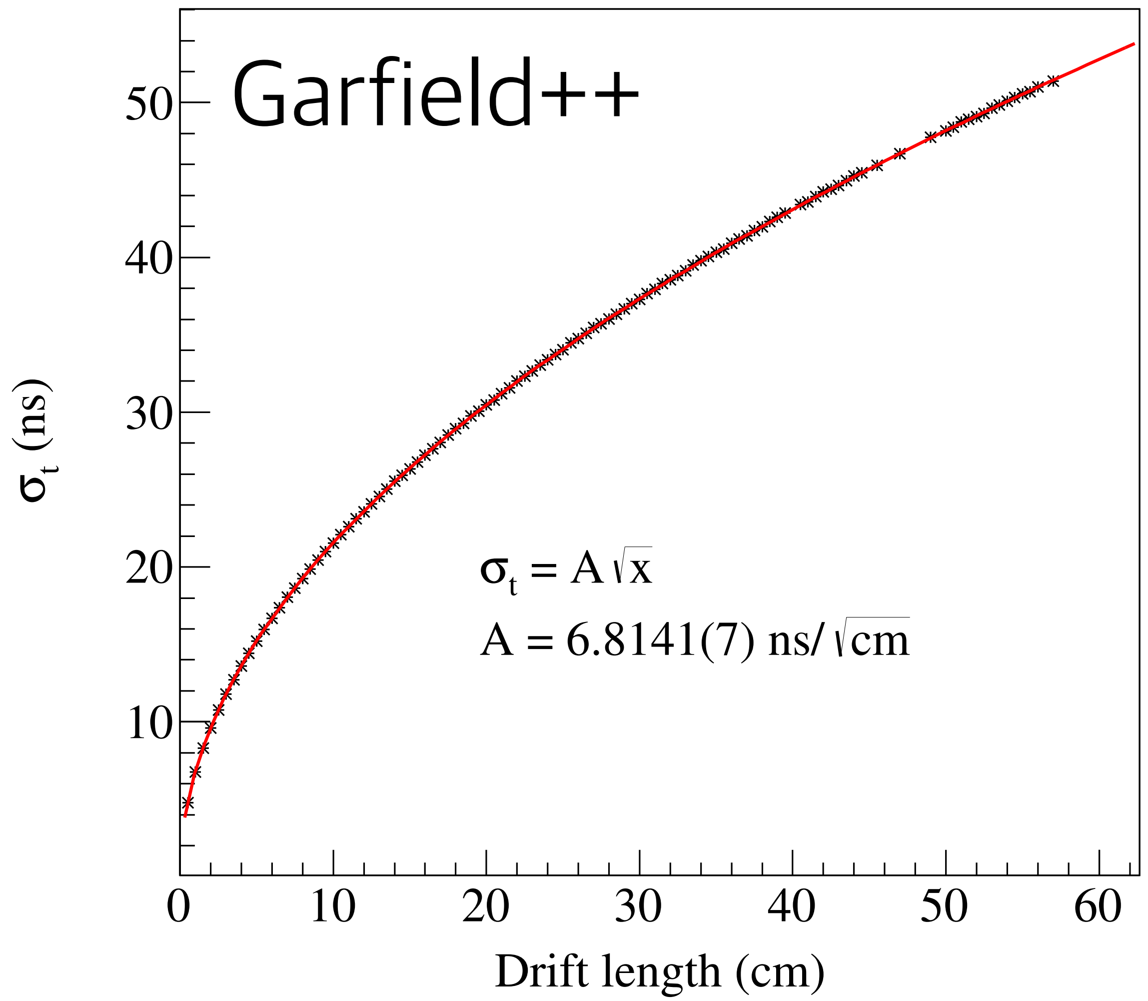
> What does the last comment mean?

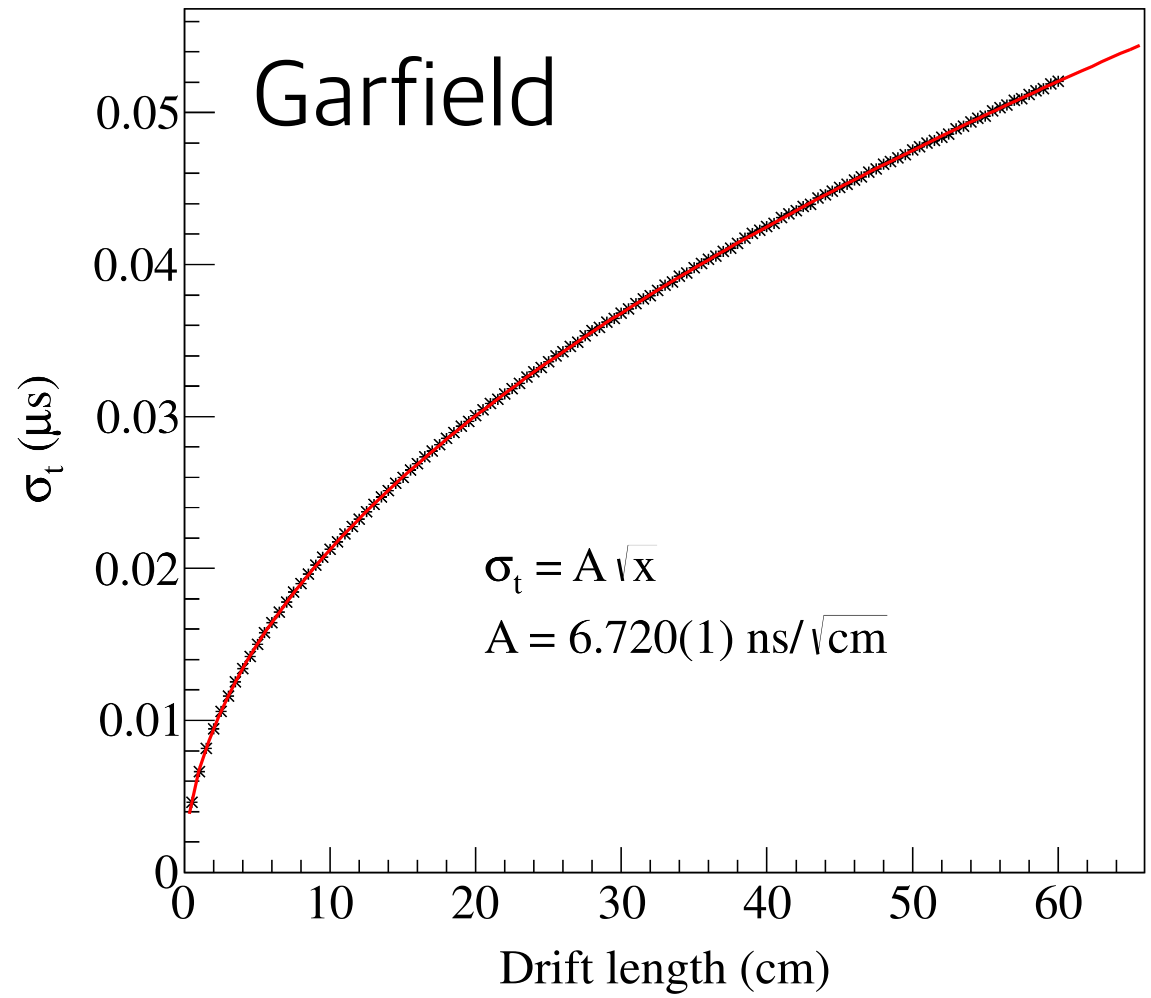
There are 3 (principal) algorithms: RKF for long distances, MC which was a failed attempt at doing microscopuc tracking based on transport tables and the actual microscopic tracking method. In the Garfield 'notes' you'll find the explanation why MC failes for electrons.

For ions, one still uses MC but ions are fortunately not much affected by B fields. Currently most of our efforts are directed at ions and we hope to come up with better ion transport.

Drift space simulation – Longitudinal diffusion

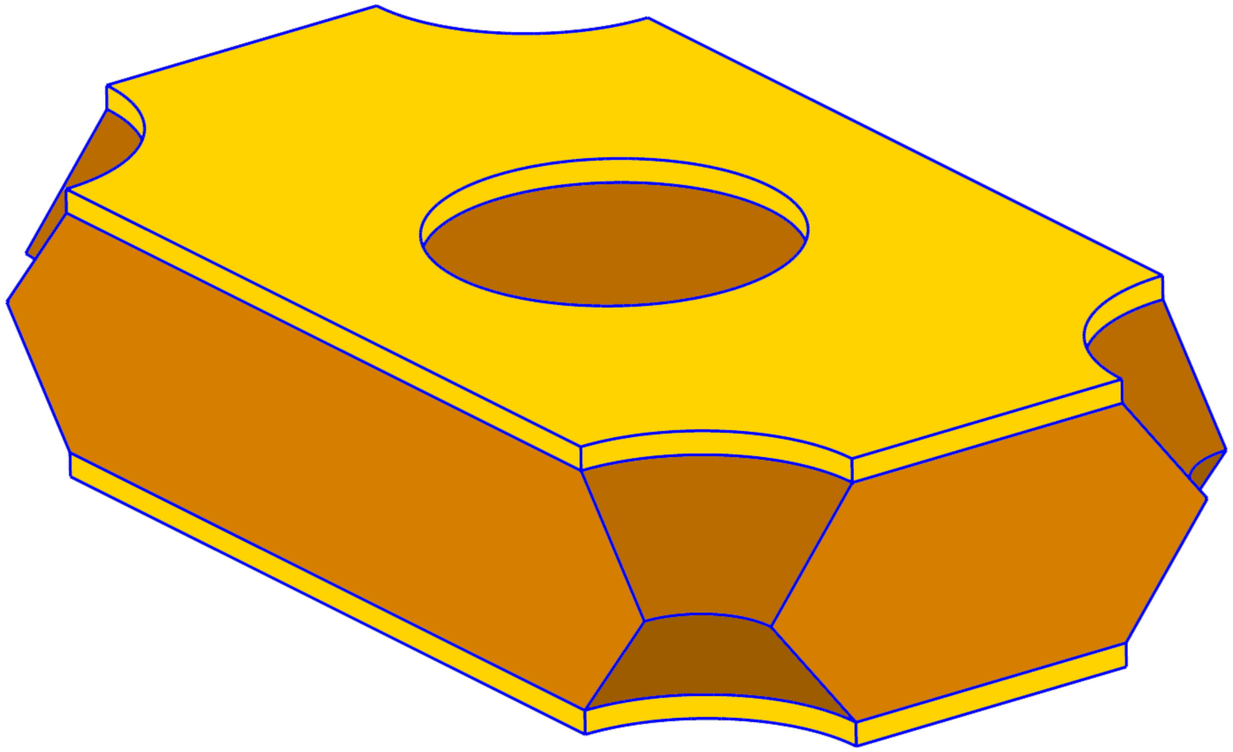
Magboltz2: $\sigma_{\mathrm{L}} = 6.710\ \mathrm{ns}/\sqrt{\mathrm{cm}}$





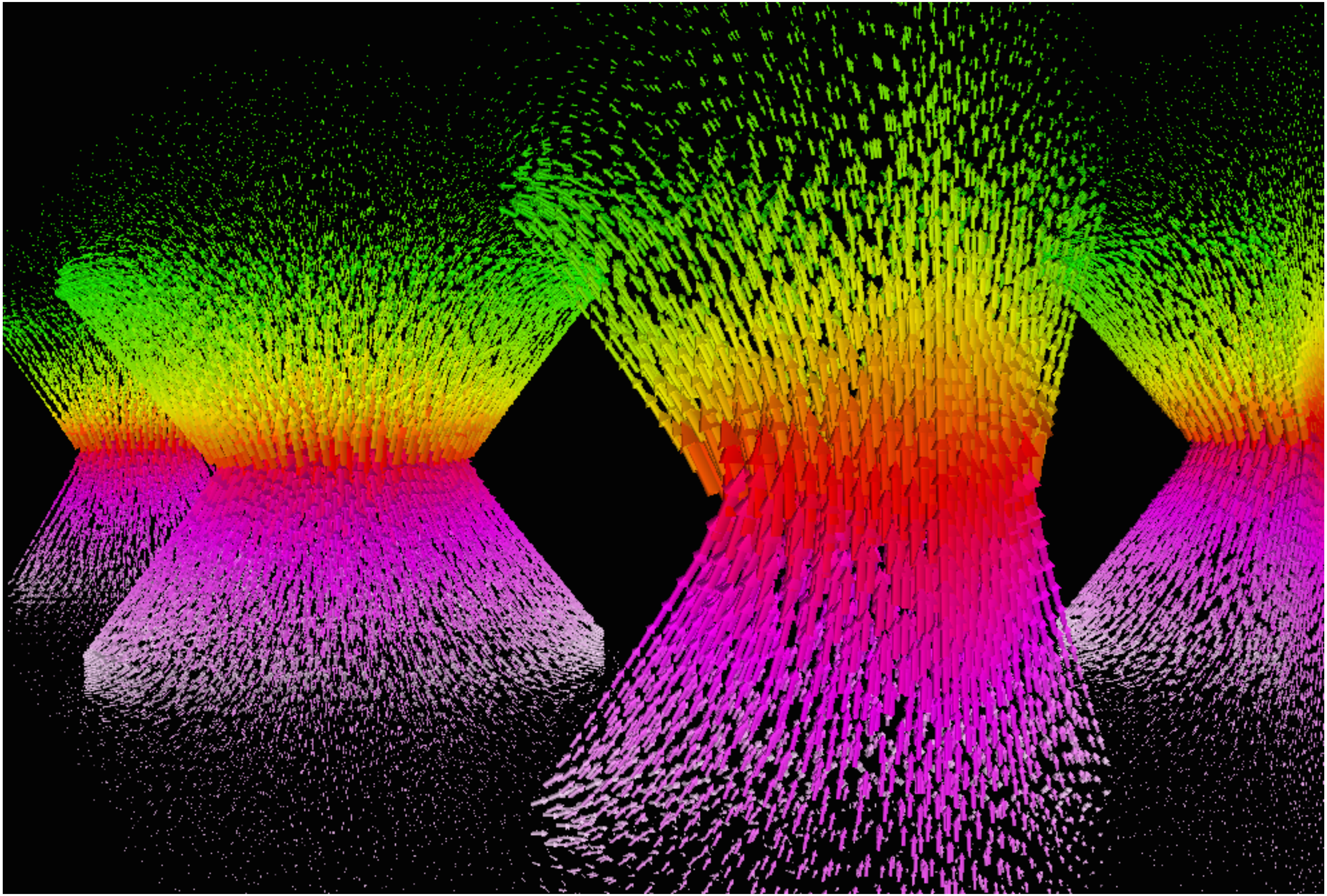
- Since the longitudinal direction are independent of the magnetic field, differences are not that large compared to the lateral dispersion case.

GEM dimensions

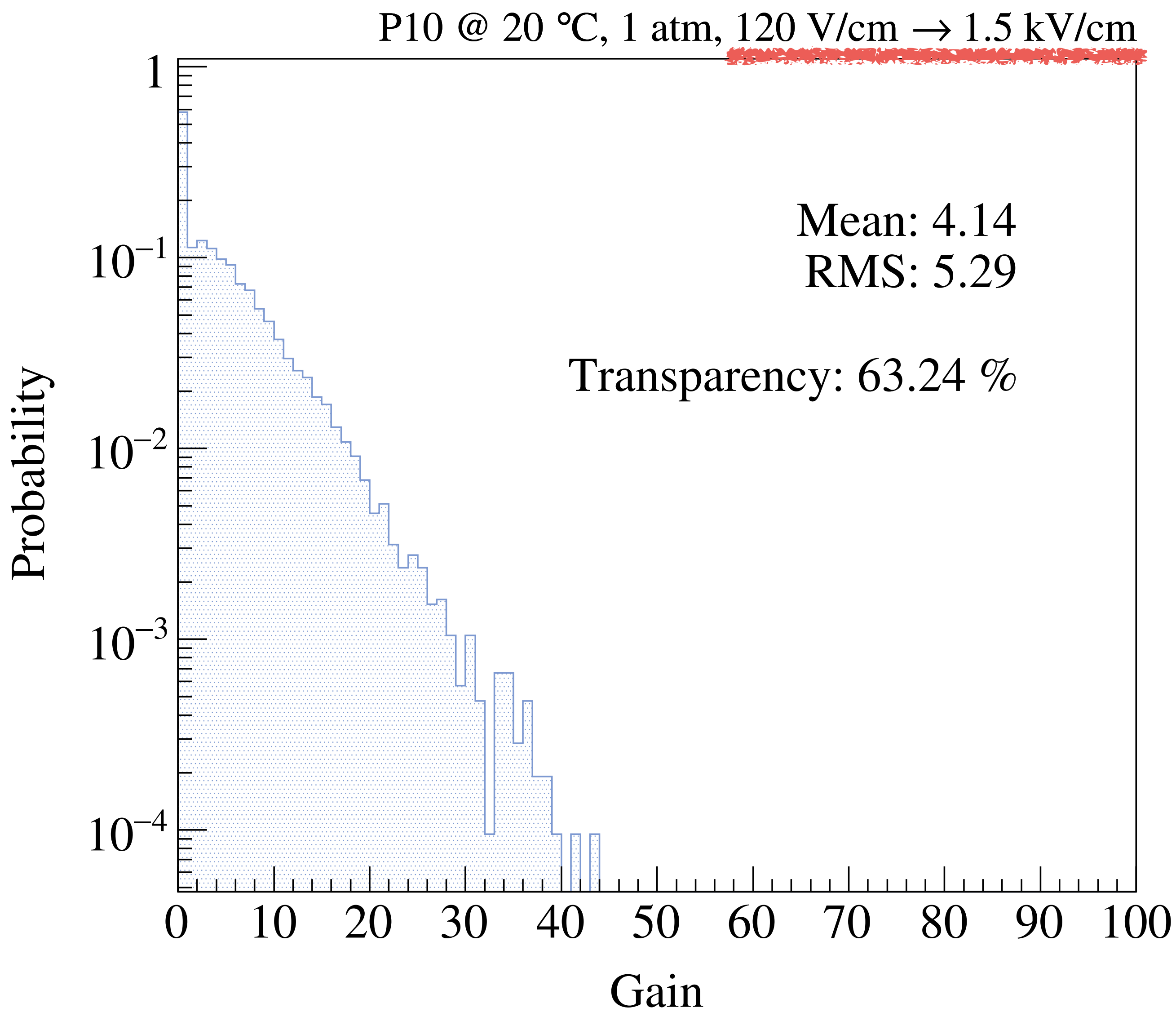


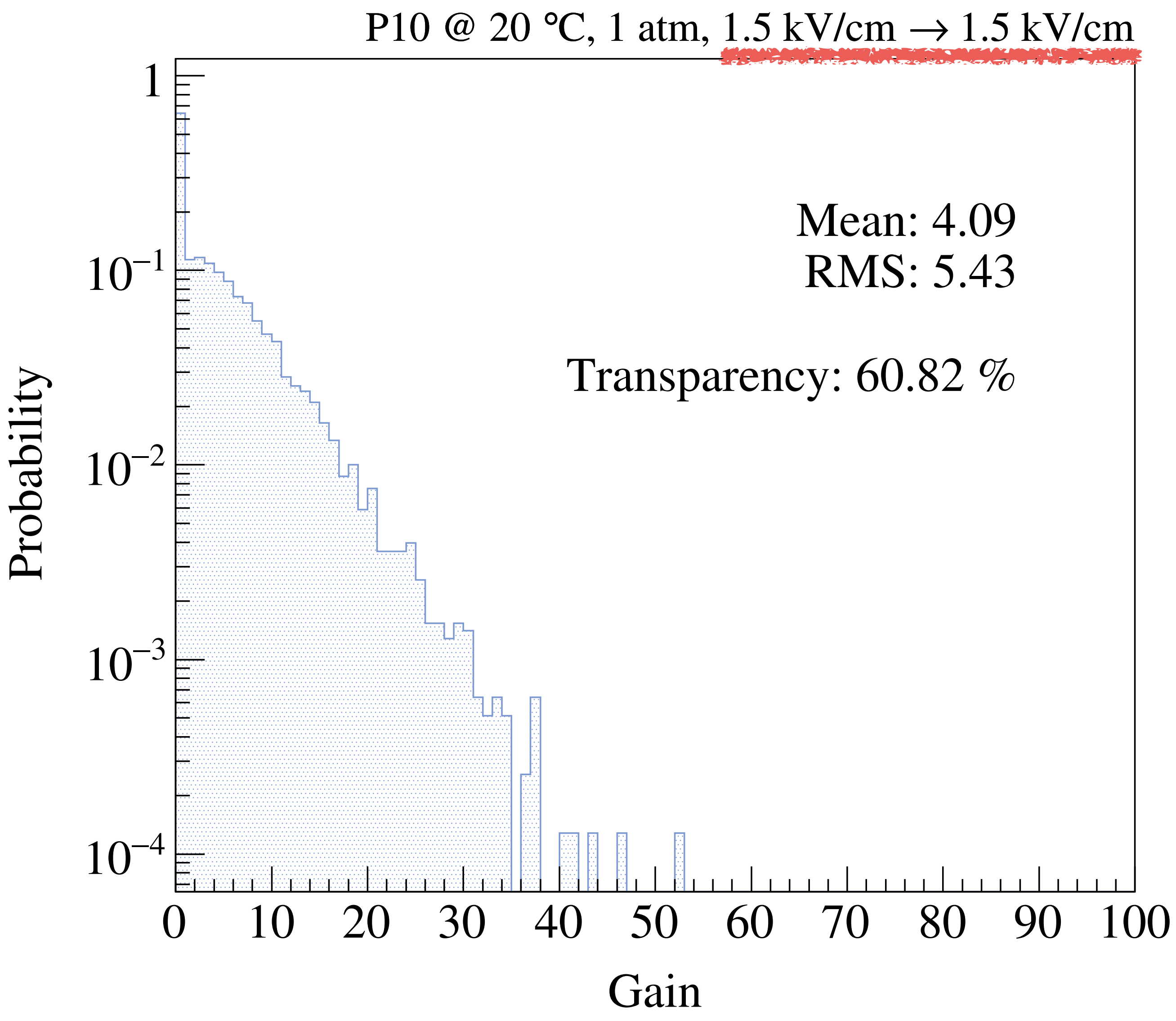
Hole pitch	140 μm
Outer diameter	75 μm
Inner diameter	35 μm
Kapton thickness	50 μm
Copper thickness	5 μm

Electric field in GEM hole

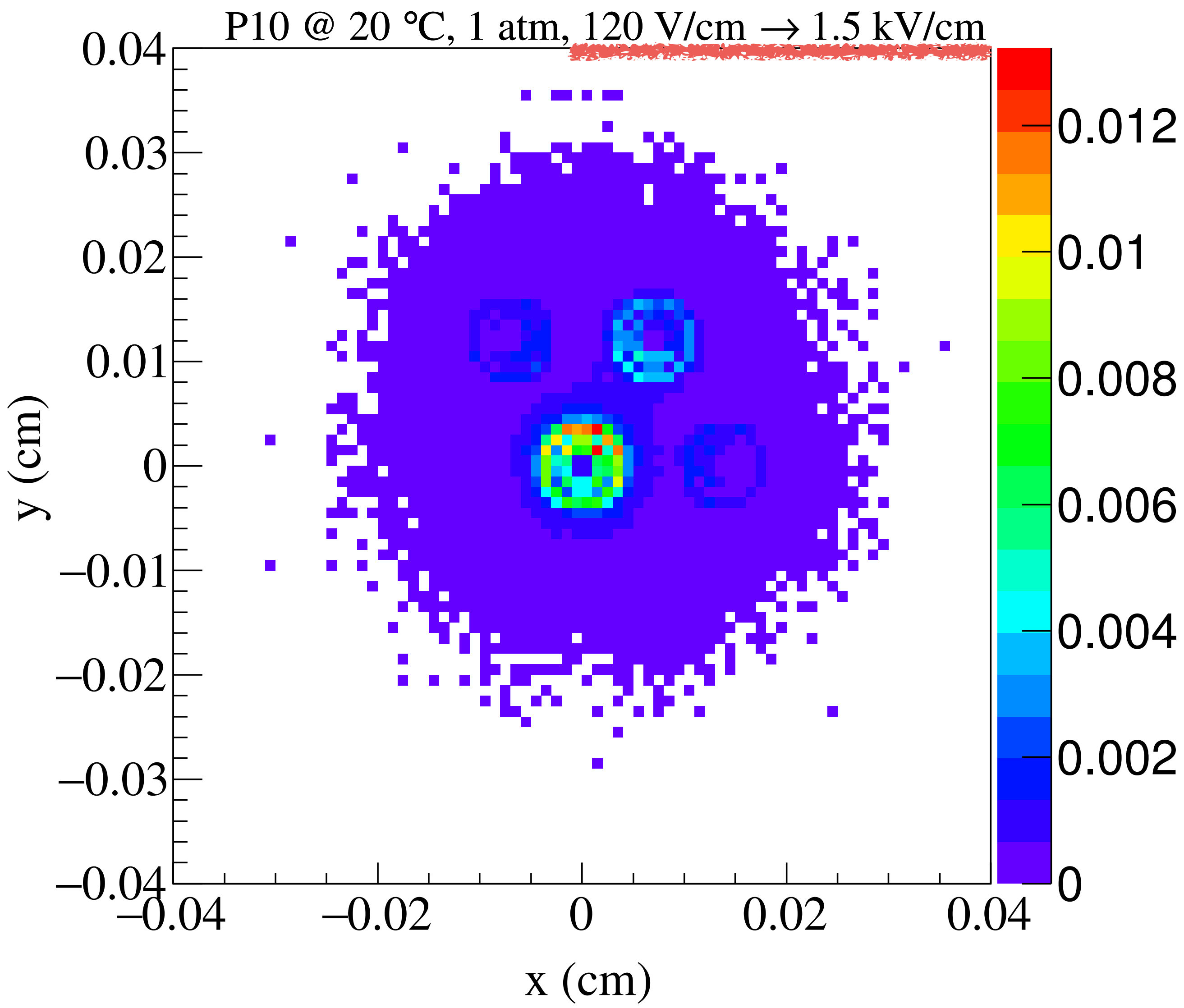


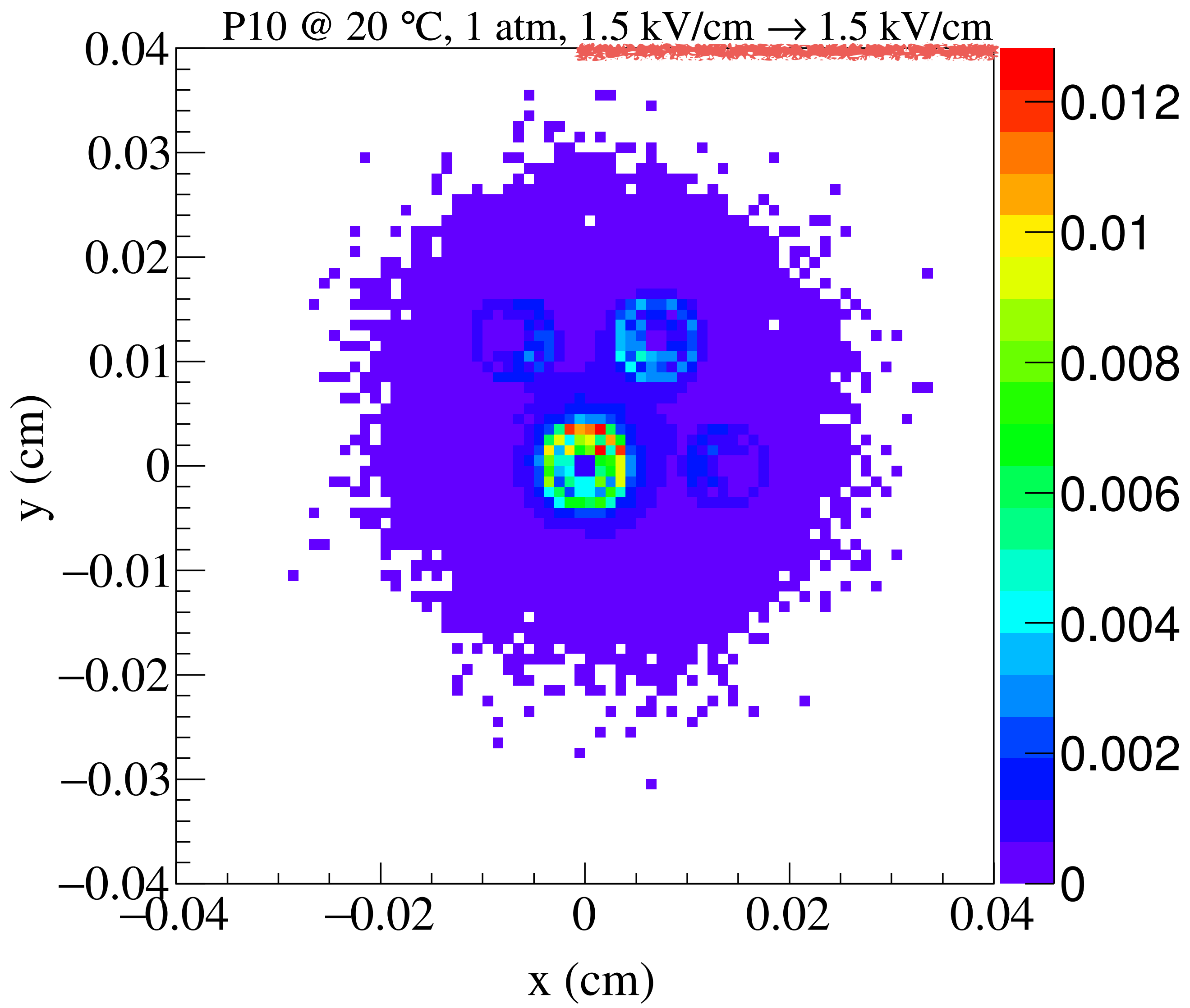
GEM simulation - Gain

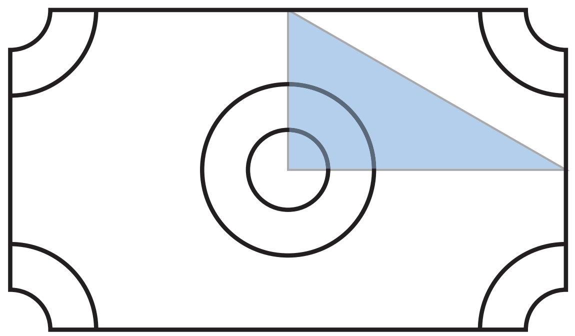




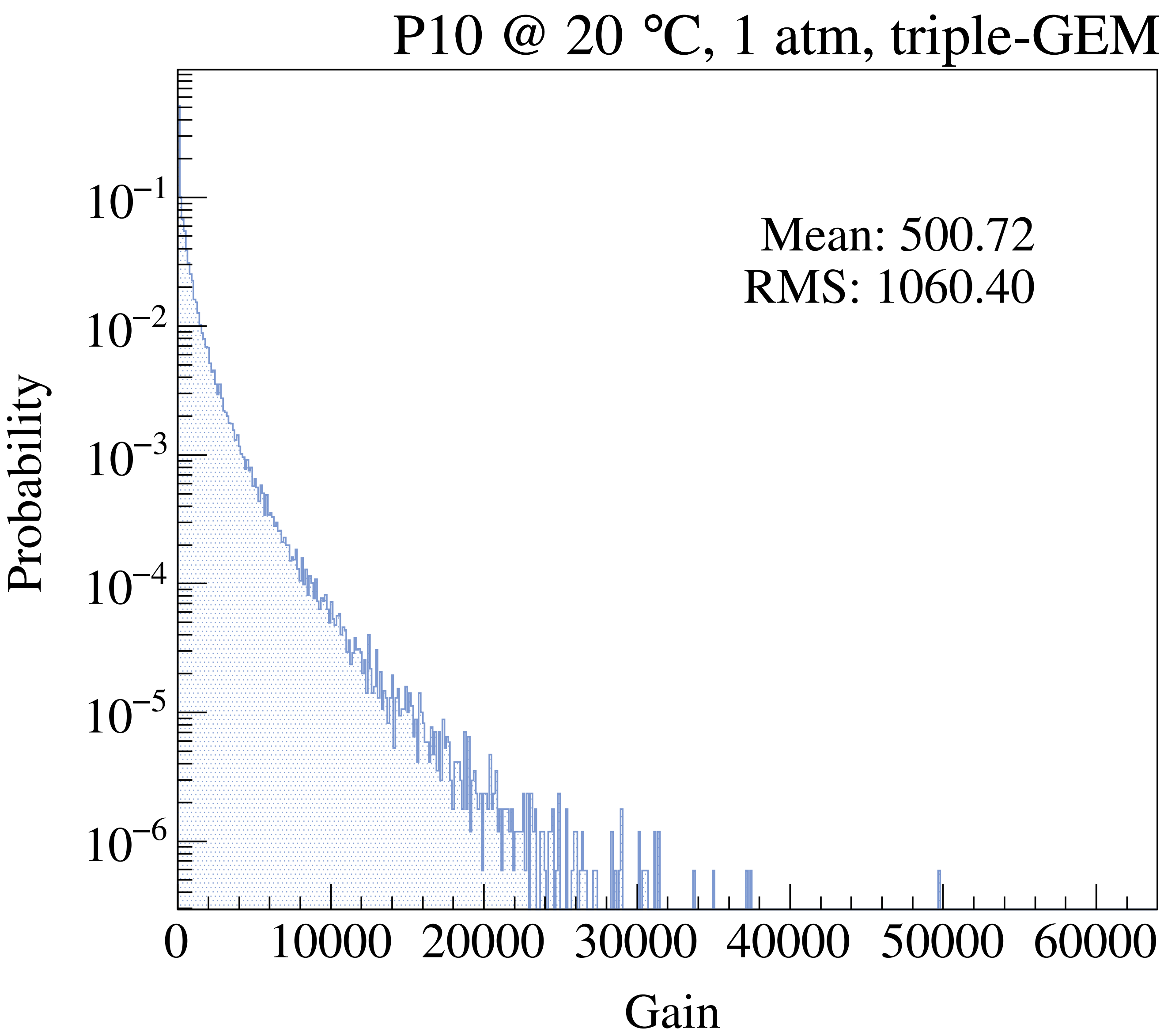
GEM simulation - diffusion

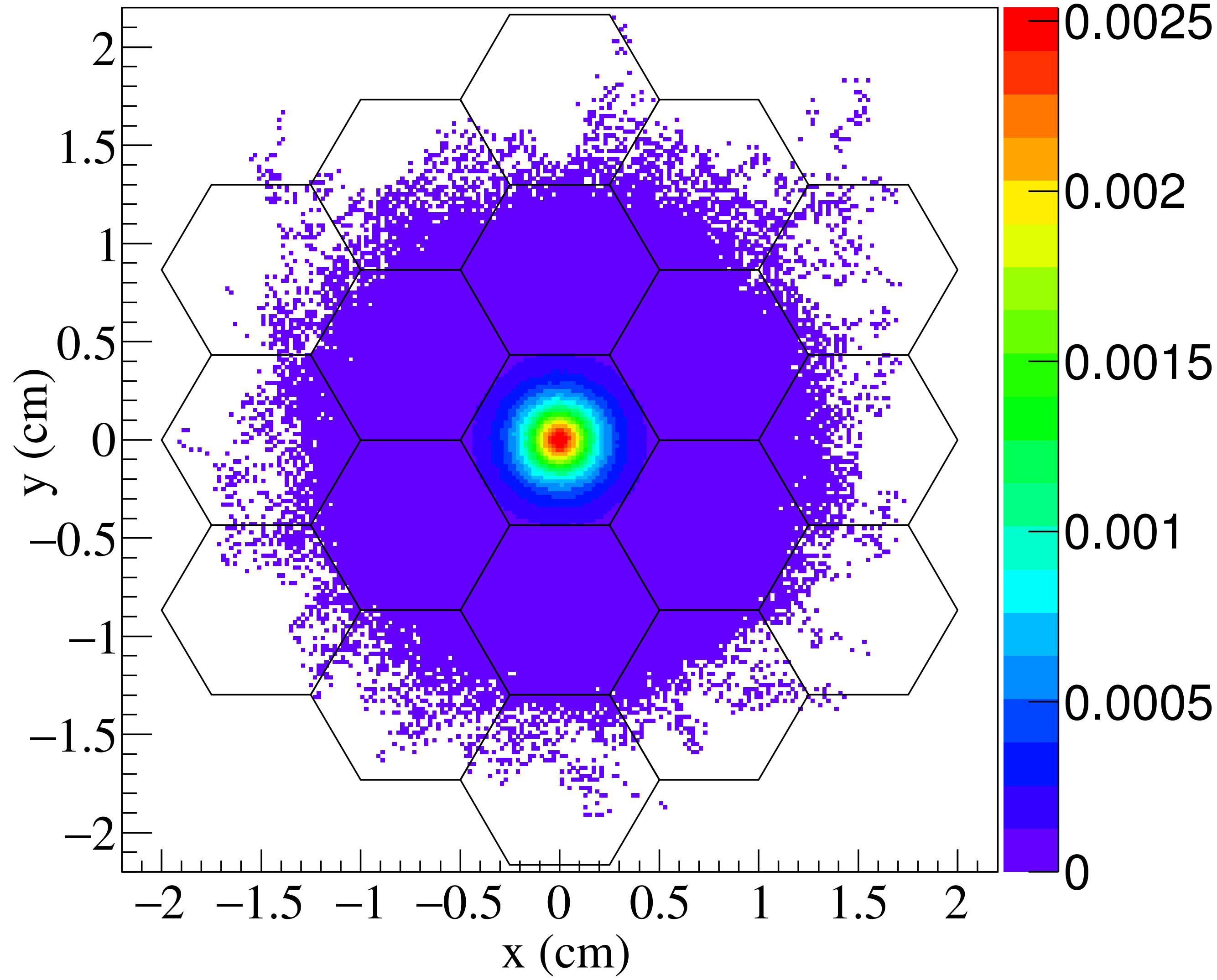






GEM simluation - Triple GEM





Parameter	120 V/cm	1500 V/cm
σ_{T} (μm/$\sqrt{\mathrm{cm}}$)	206.91	539.91
σ_{L} (μm/$\sqrt{\mathrm{cm}}$)	372.03	223.13
v_{d} (cm/μs)	5.544	2.349