Large Prototype JGEM Analysis
Study for nonuniform magnetic field

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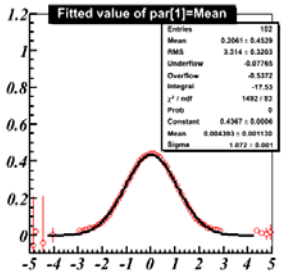
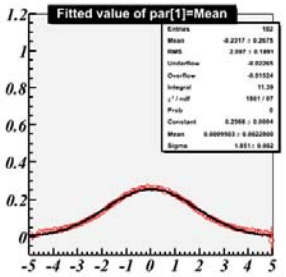
Padresponse

B=O[T]

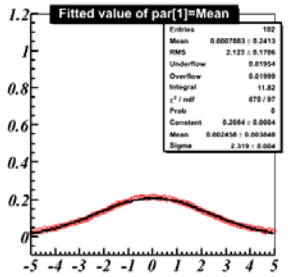
DL10cm



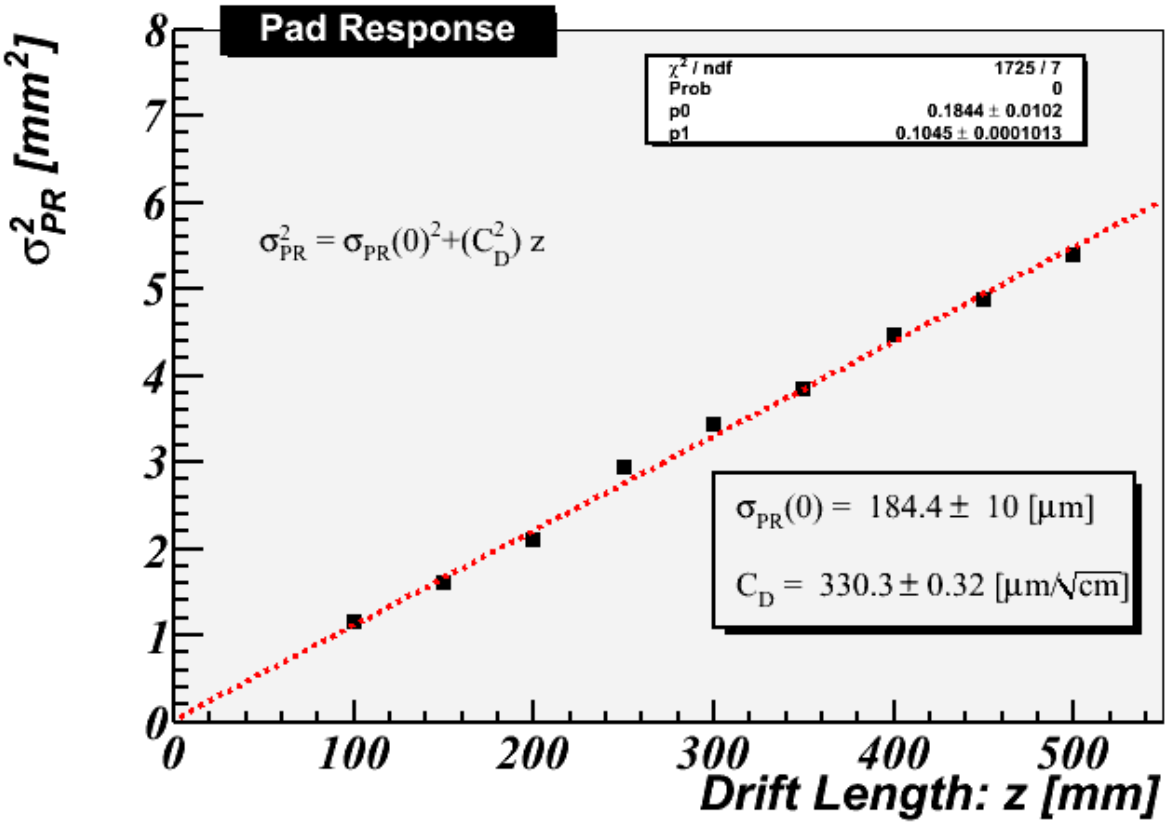
DL30cm



DL50cm



Center module
Pad row 19



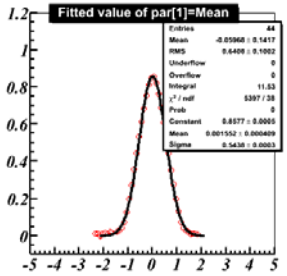
Garfield

$$C_D = 311.8[\mu m / \sqrt{cm}]$$

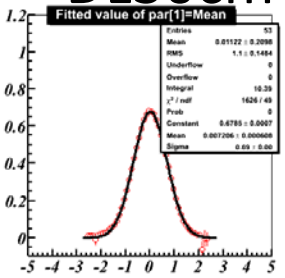
Padresponse

B=1[T]

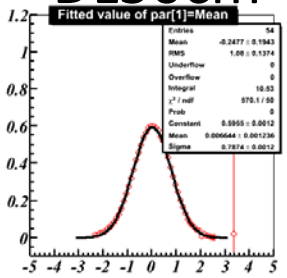
DL10cm



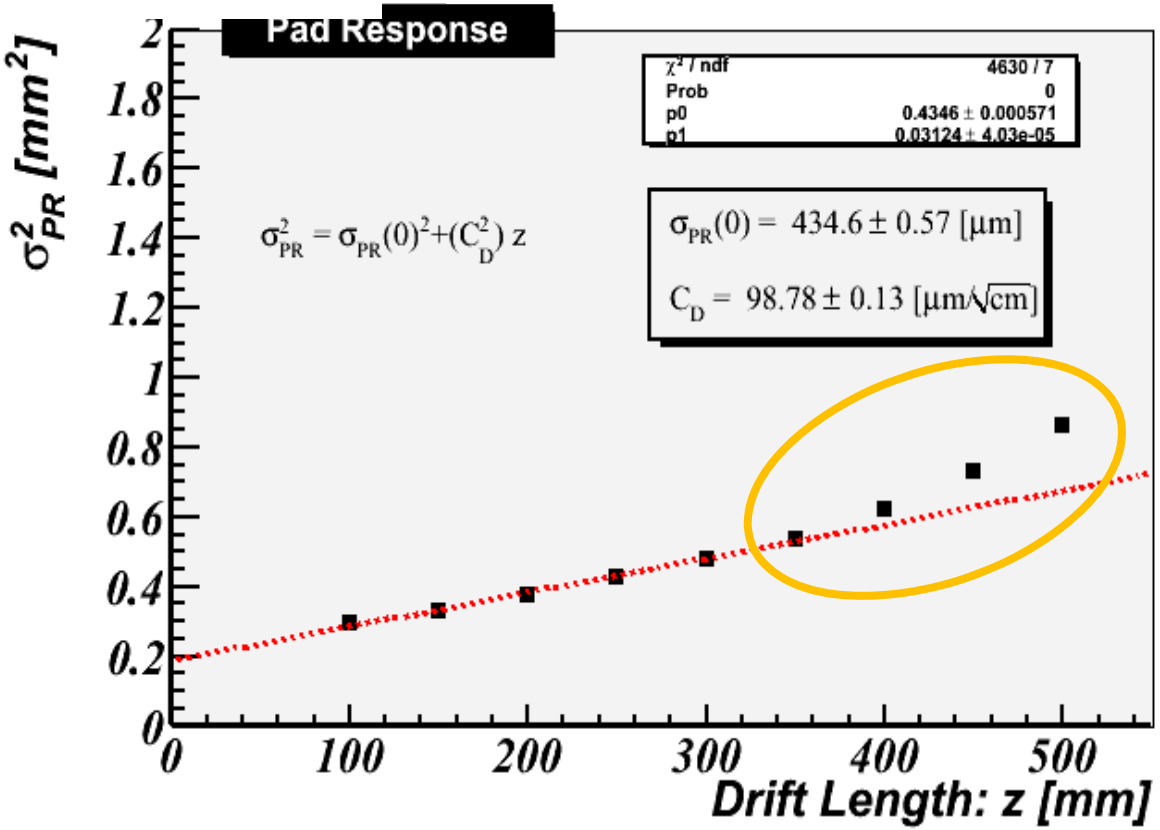
DL30cm



DL50cm



Center module
Pad row 19



Garfield

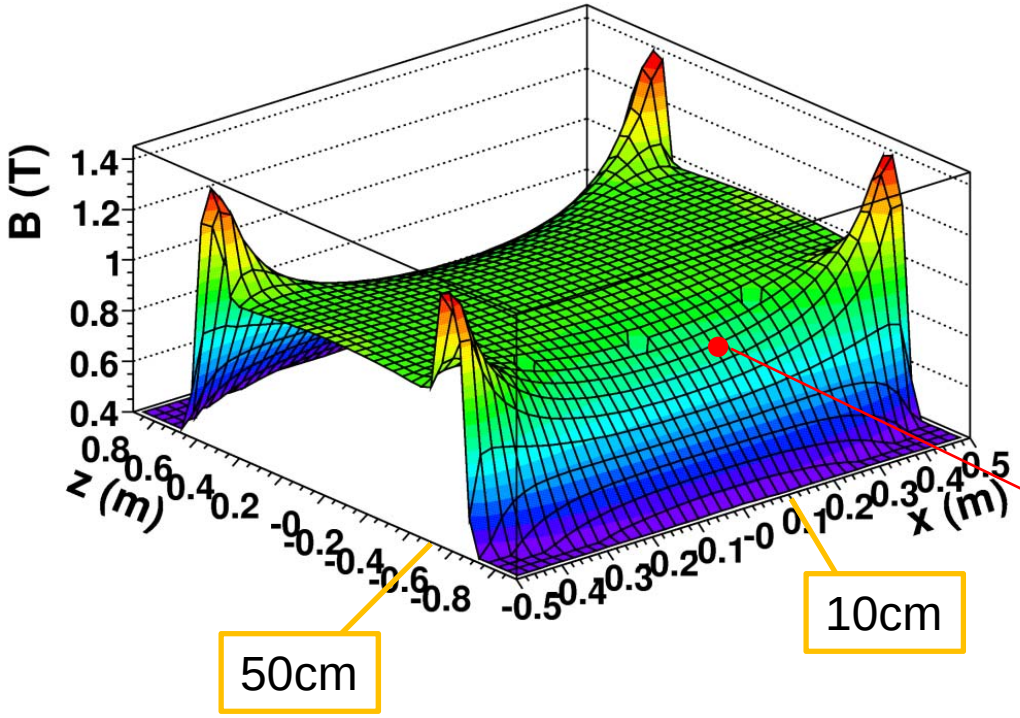
$$C_D = 95.4[\mu m / \sqrt{cm}]$$

PR is broadening

DL50cm
Measurement
$\Rightarrow \sigma_{PR}^2 = 0.88$ [mm²]
Fit
$\Rightarrow \sigma_{PR}^2 = 0.67$ [mm²]

Magnetic field change at GEM

I check magnetic field.



Center module Pad row 19
→ x = about 10 [cm]

Drift length 50 [cm]

about 0.8 [T]

Magnetic field at GEM

I think magnetic field decrease at GEM so PR is broadening.

4 [mm], Et = 900 [V/cm]

2 [mm], Ei = 900 [V/cm]

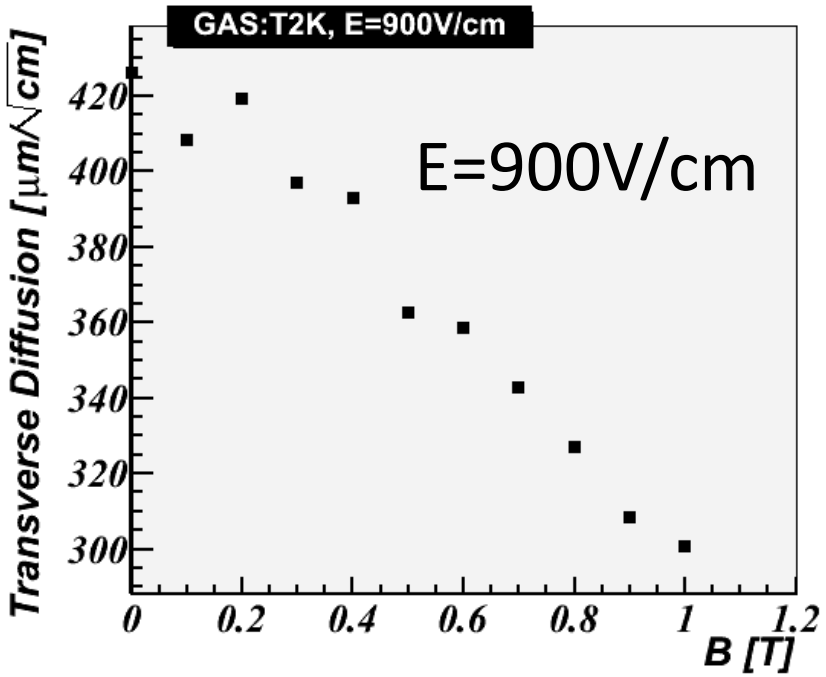
Simulation by Garfield

LP1 status

Ed = 230 [V/cm],

Et = 900 [V/cm], Ei = 900 [V/cm]

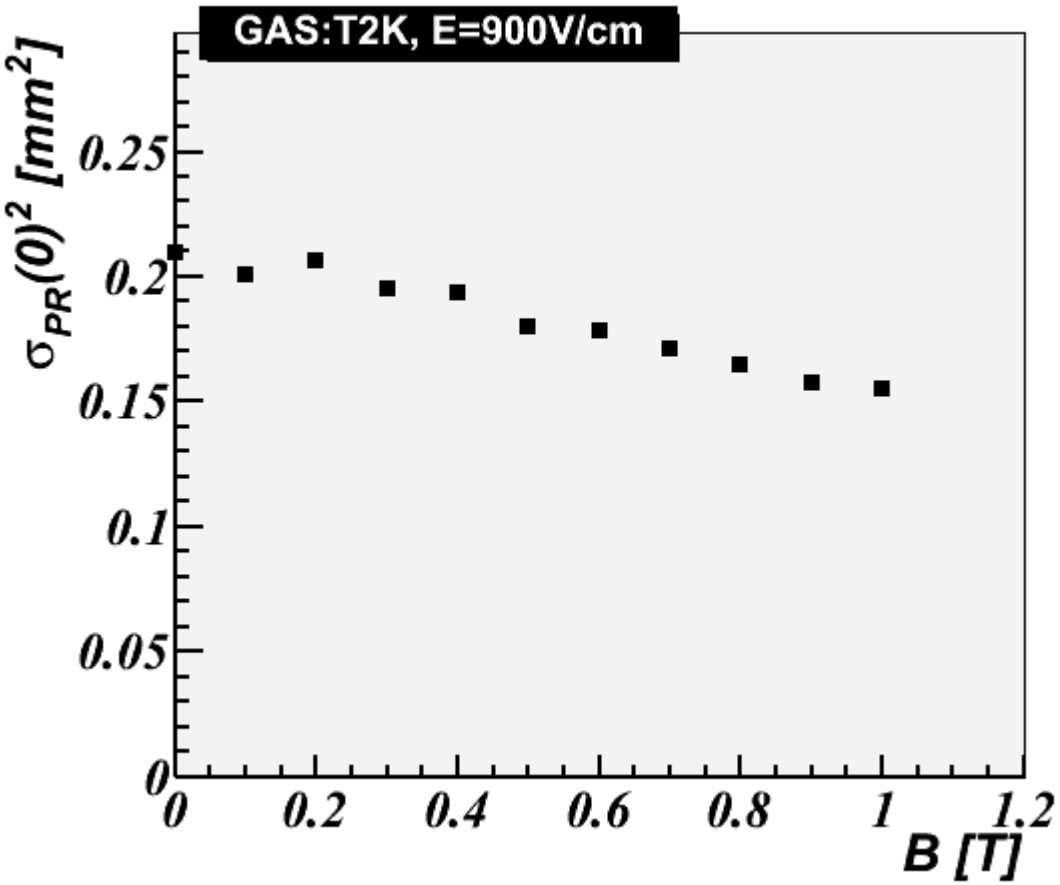
Gas=T2K (Ar:CF4:iC4H10 = 95:3:2)



$$\sigma_{PR}^2 = \sigma_{PR}(0)^2 + C_D^2 z$$

$$\sigma_{PR}(0)^2 = \sigma_t^2 + \left(\frac{padwidth}{\sqrt{12}} \right)^2$$

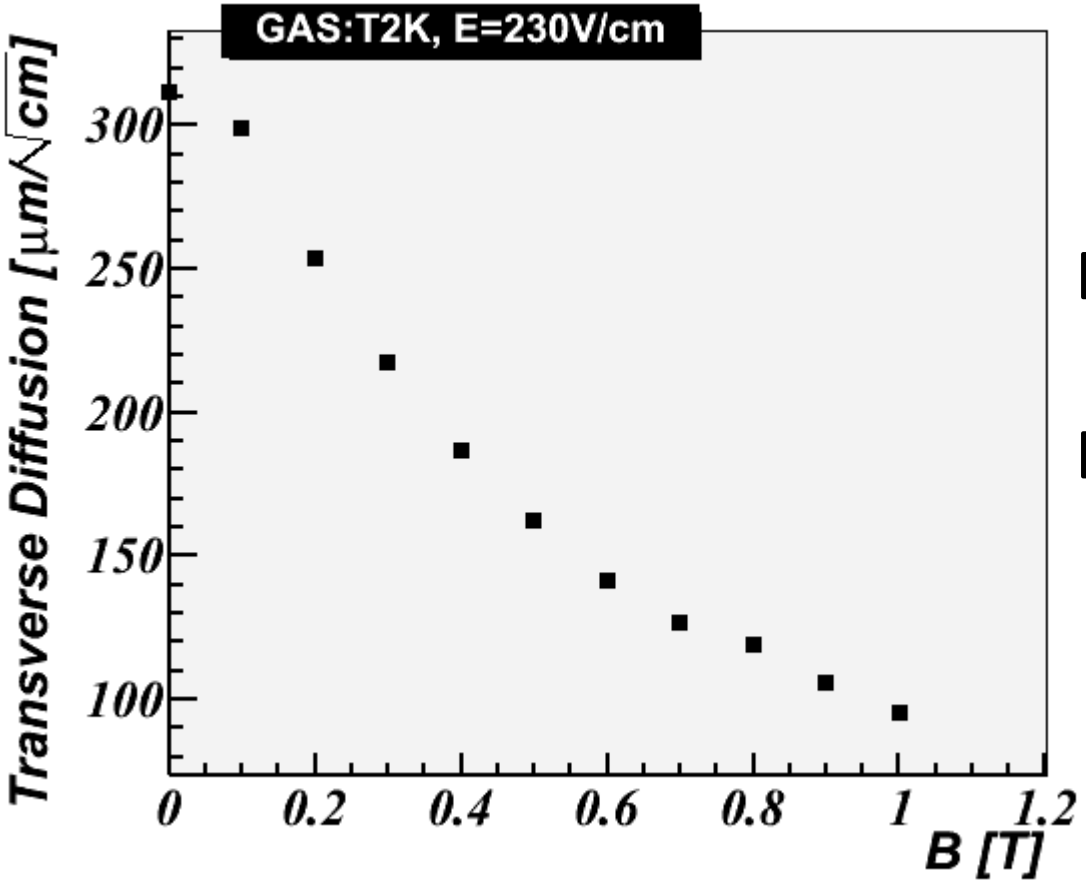
Transfer length = 4 [mm]
Induction length = 2[mm]
Pad width = 1.2[mm]



B = 1 [T]
⇒ 0.155 [mm²]

B = 0.8 [T]
⇒ 0.165 [mm²]

$$\sigma_{PR}^2 = \sigma_{PR}(0)^2 + C_D^2 z$$



B = 1 [T]

C_D^2 = 0.009 [mm²/cm]

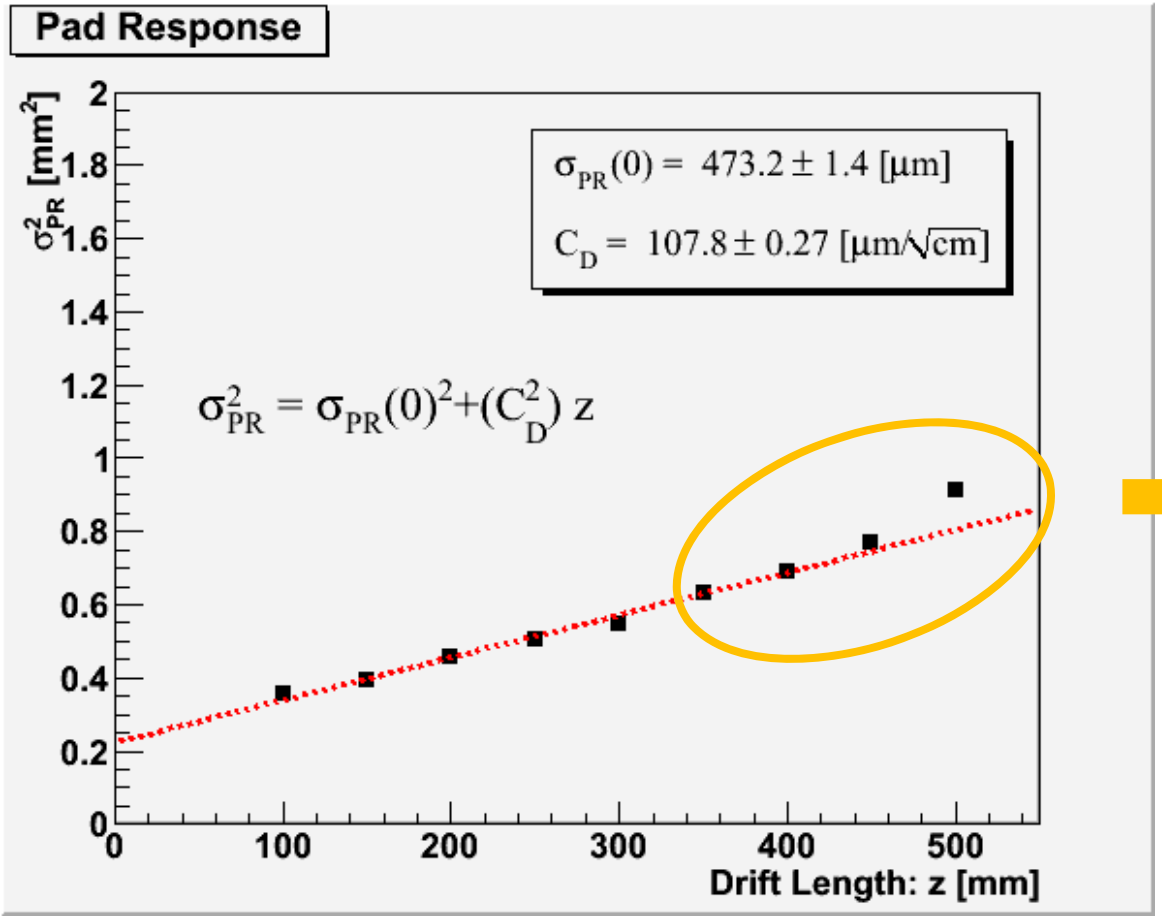
B = 0.8 [T]

C_D^2 = 0.012 [mm²/cm]

PR broadening have a few contribution from the change of magnetic field.

I check the Downside module

Downside module Pad row 5



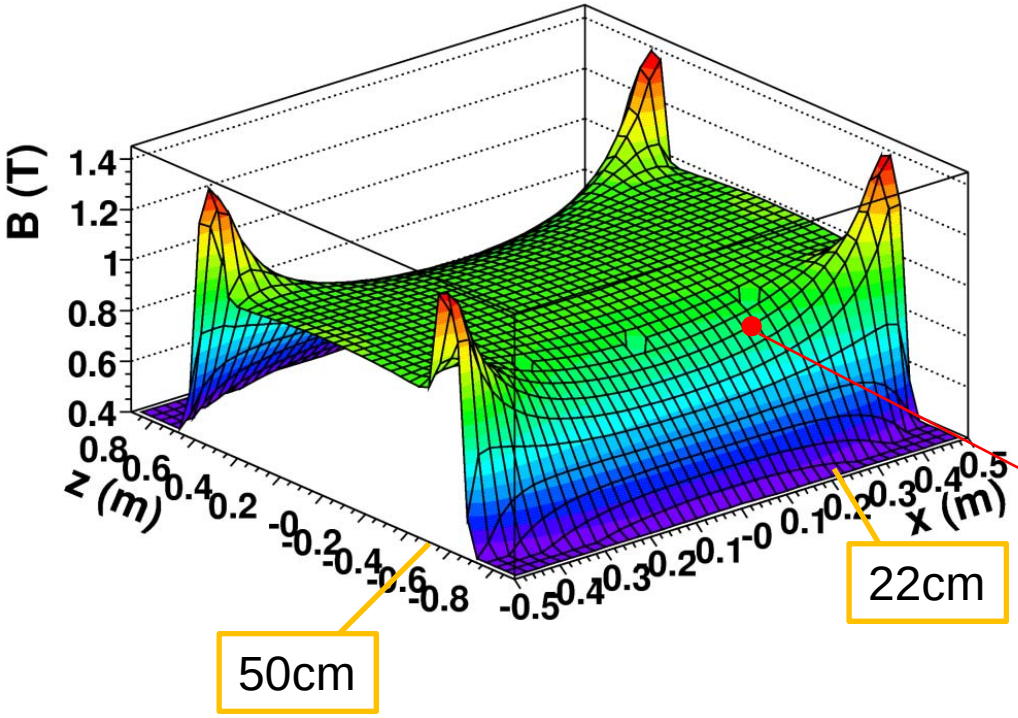
Garfield

$$C_D = 95.4[\mu m / \sqrt{cm}]$$

PR is a few broadening

Magnetic field change at GEM

I check magnetic field.



Downside module Pad row 5
→ x = about 22 [cm]

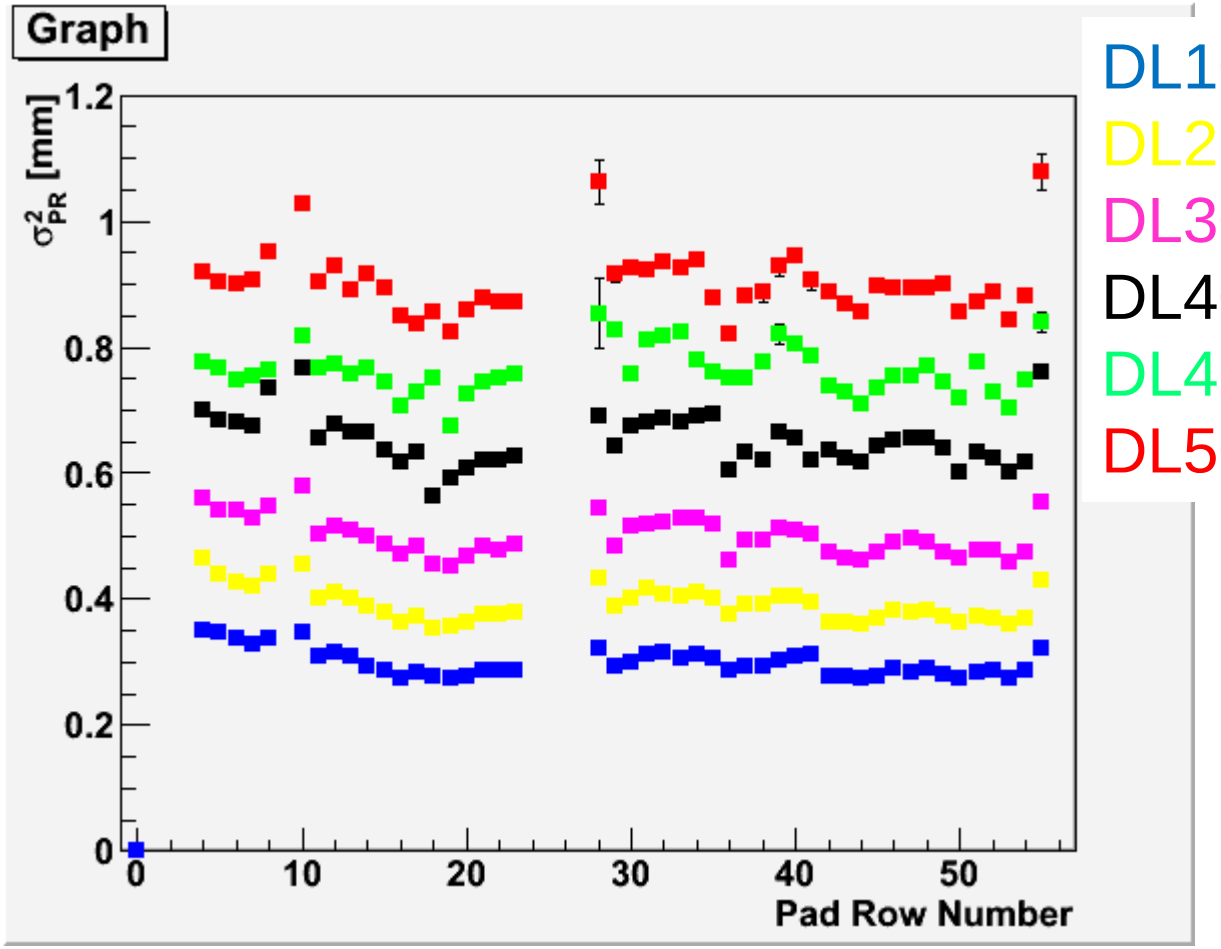
Drift length 50 [cm]

about 0.9 [T]

This is higher magnetic field than Center module pad row 19.

σ_{PR}^2 vs pad row number

I check sigmaPR for each pad row.



This show sigmaPR is dependence for position.

summary

- PR broadening have a few contribution for the change of magnetic field by simulation.
- I think σ_{PR} have dependence for position.

Next step

- I check σ_{PR} have dependence for position at 0T.