VRVS Meeting

DESY, Hamburg

-

University of Victoria

Overview

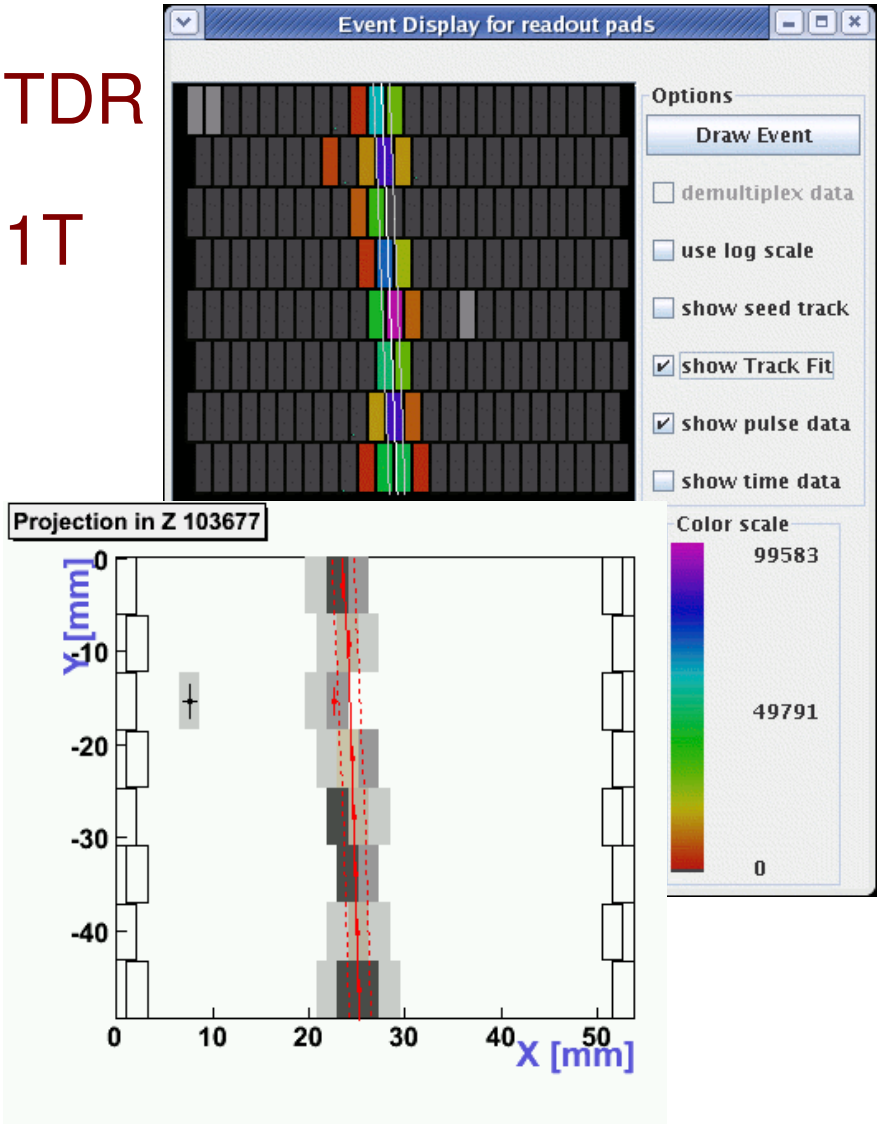
- Comparison between JTPC and MultiFit
  - On event by event basis
  - Diffusion analysis
  - Resolution analysis
- Storing of pad-layout in LCIO

JTPC - MultiFit

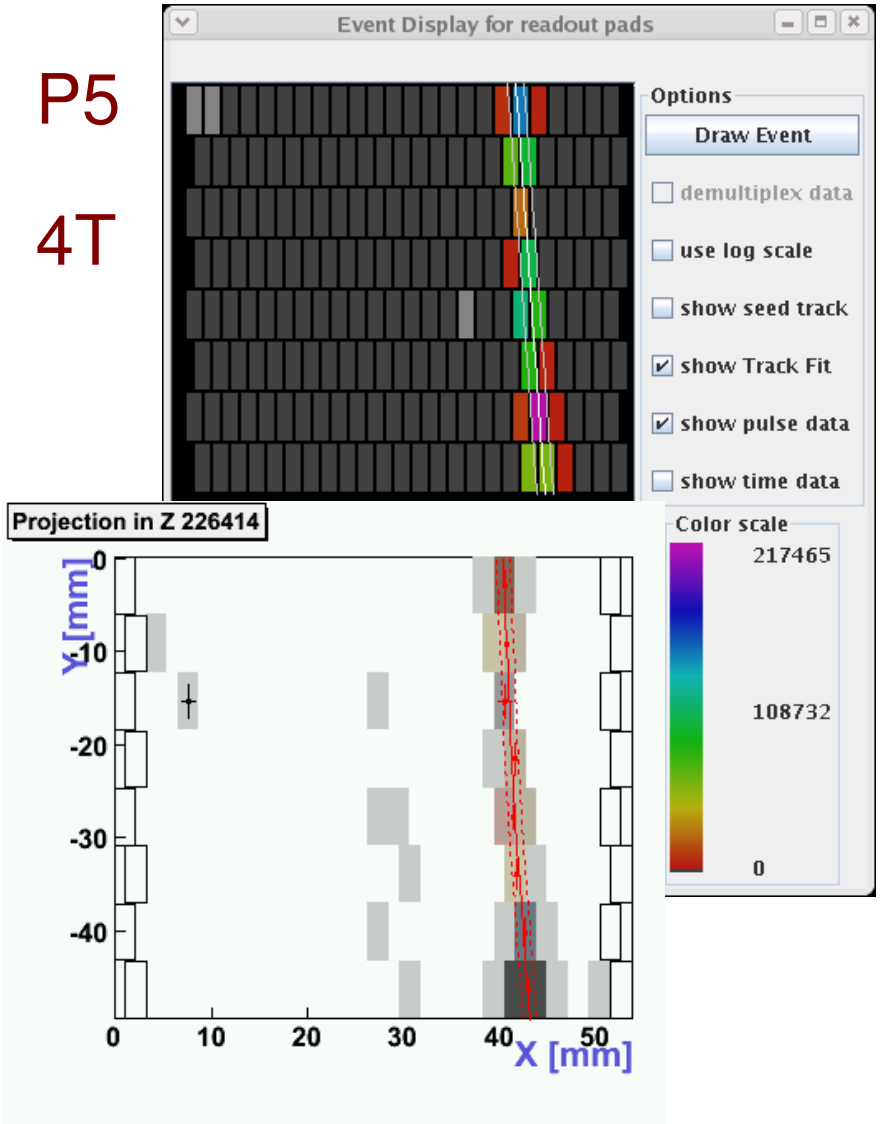
- JTPC
  - A Java based program packet
  - Developed and used by the TPC R&D group in Victoria
- MultiFit
  - C++ based, modular program
  - Developed at DESY
  - AdvancedCurvedFit uses same technique as JTPC

Event by Event

- TDR
- 1T



- P5
- 4T



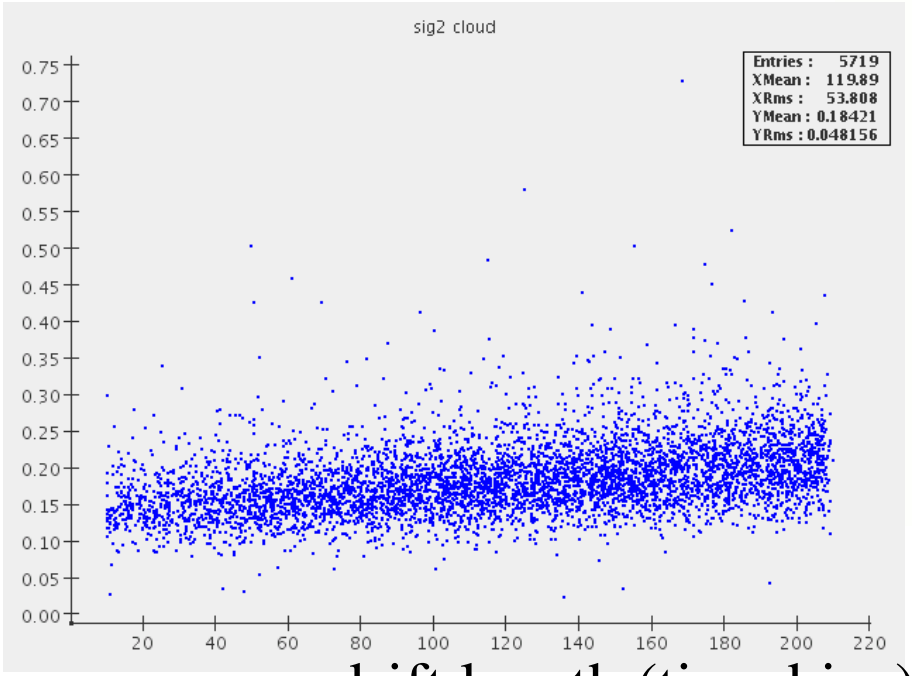
Event by Event: Results

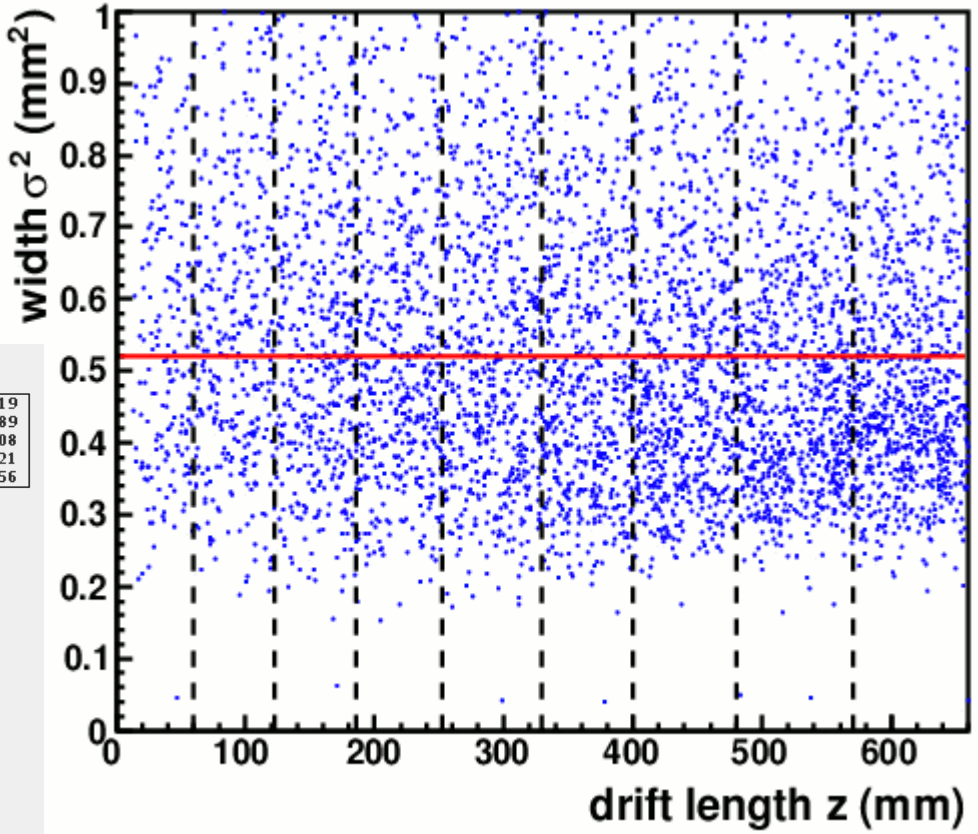
	TDR 1T		P5 4T	
	MultiFit	JTPC	MultiFit	JTPC
Intercept X / X0	23.52	-1.82	40.43	15.14
Slope X / Phi0	-0.050	0.040	-0.027	0.056
Sigma	1.140	0.947	0.695	0.395
Curvature / 1/r (10^-4)	6.00	1.40	1.20	0.99

- Differences in intercept and slope are due to the coordinate system, which is used
- Differences in sigma seems to be systematic

Diffusion: JTPC - MultiFit

- look on more events for P5 4T
- differences also seen





$$\sigma^2 = D^2 z + \sigma_0^2$$

Changes in MultiFit

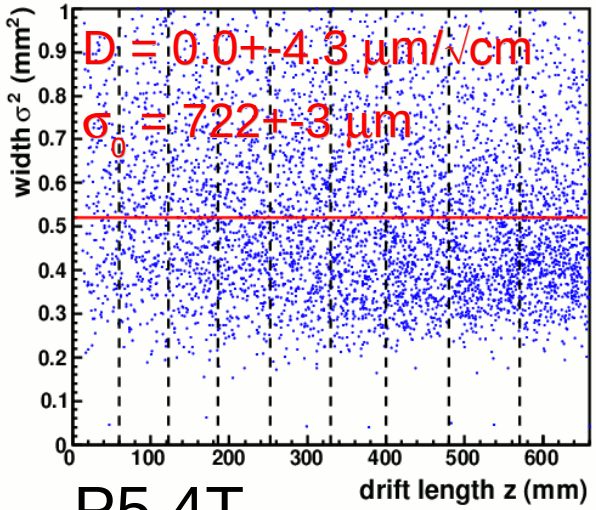
$$L = \sum_{Pad} Q_{measured} \ln\left[\left(\frac{Q_{expected}}{\sum_{Row} Q_{expected}} + N\right)/(1+N)\right]$$

- implement a noise N
  (renormalisation to reweight pads with small signal)

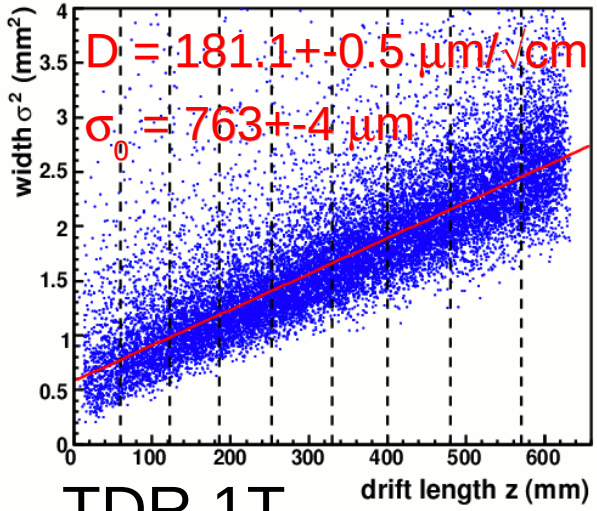
- And for calculation the charge of one pulse, integrating is expended to time bins before and after pulse over threshold: Also negative signal are taken into account

Diffusion Before and After the Change

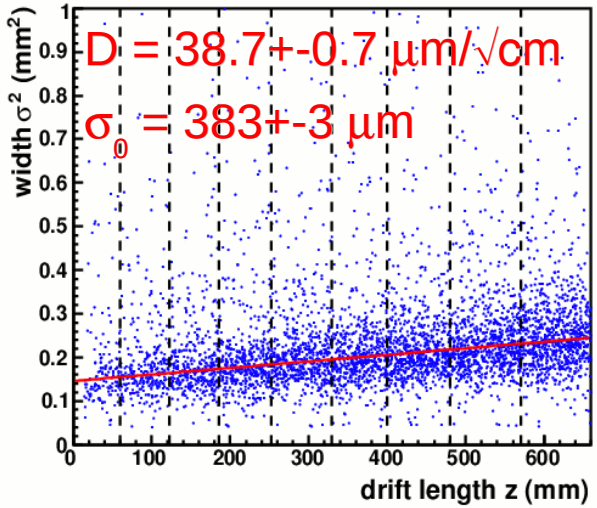
- small changes in diffusion coefficient D
- huge impact on defocusing constant σ_0

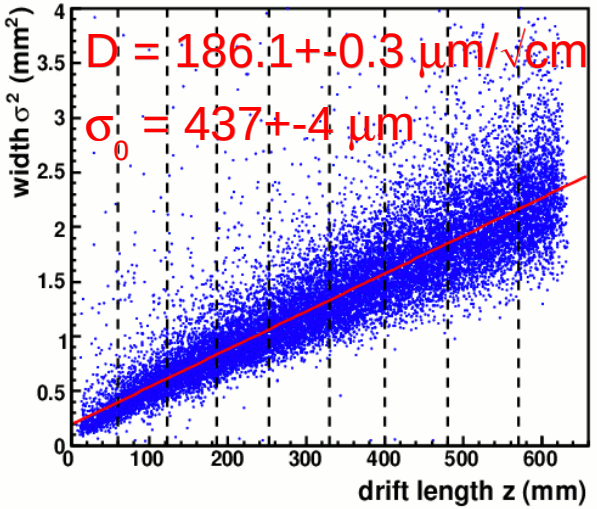


P5 4T

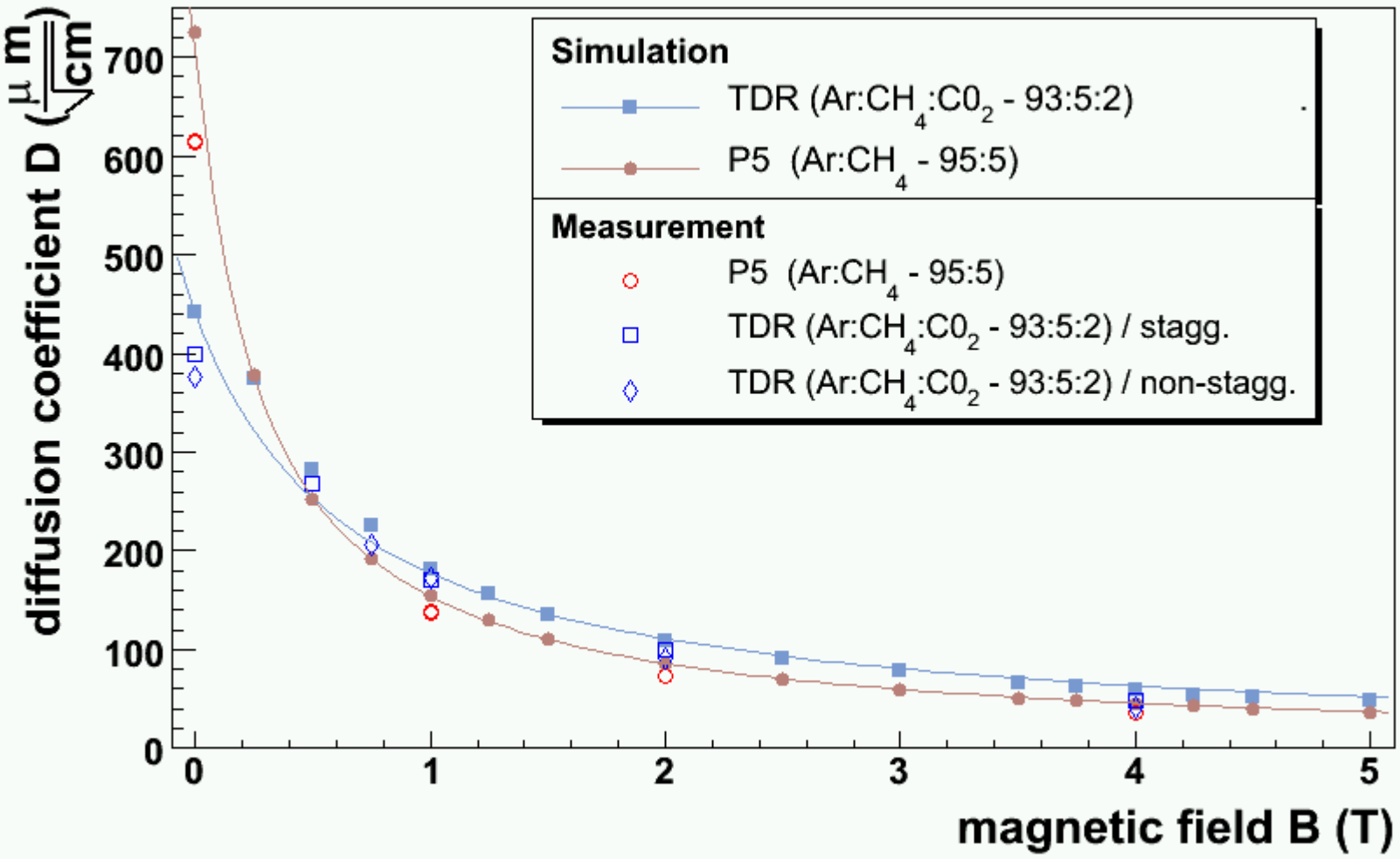


TDR 1T



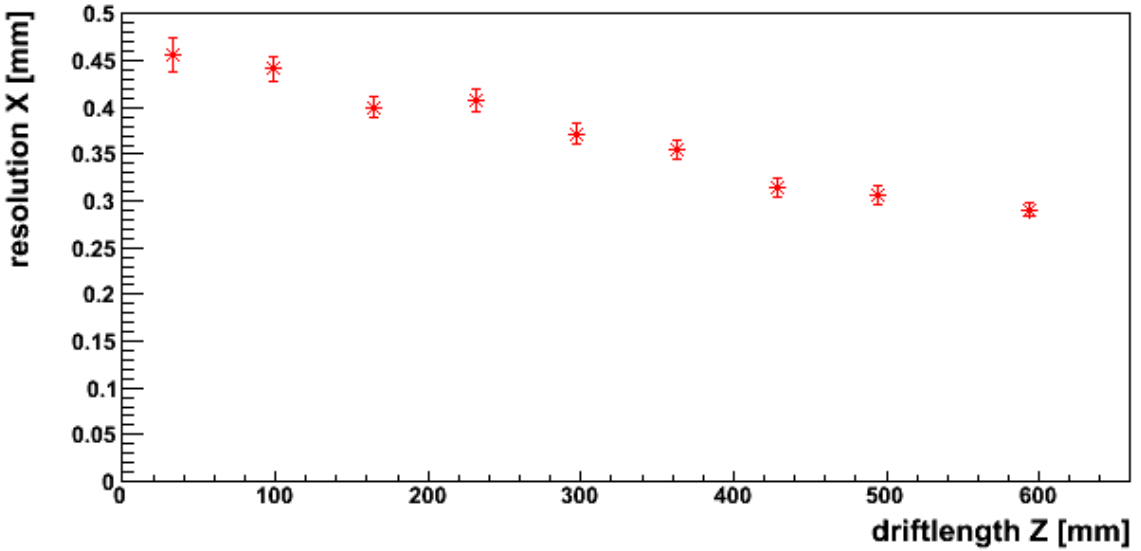


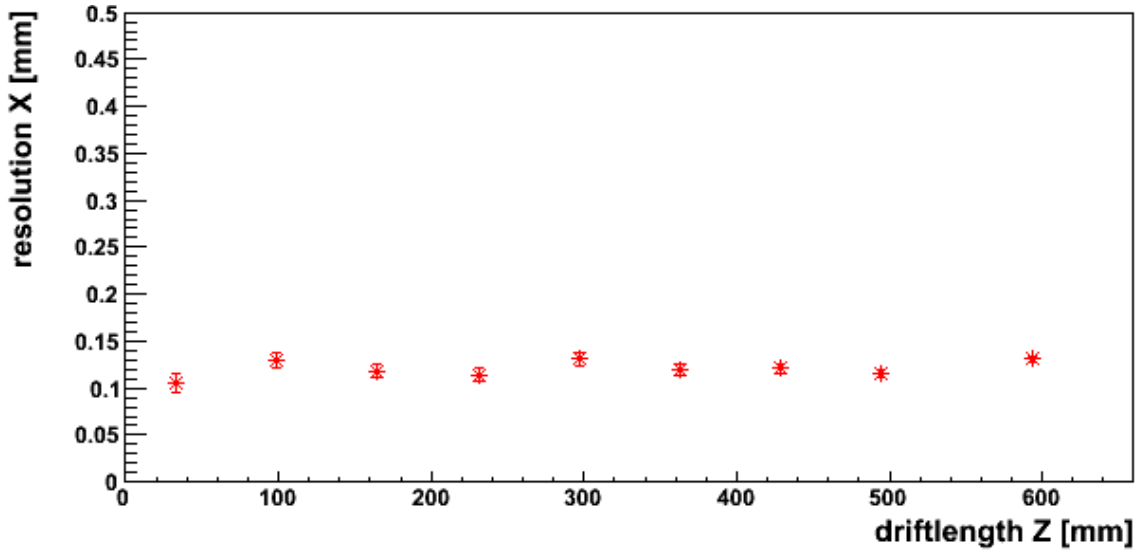
Diffusion Coefficient



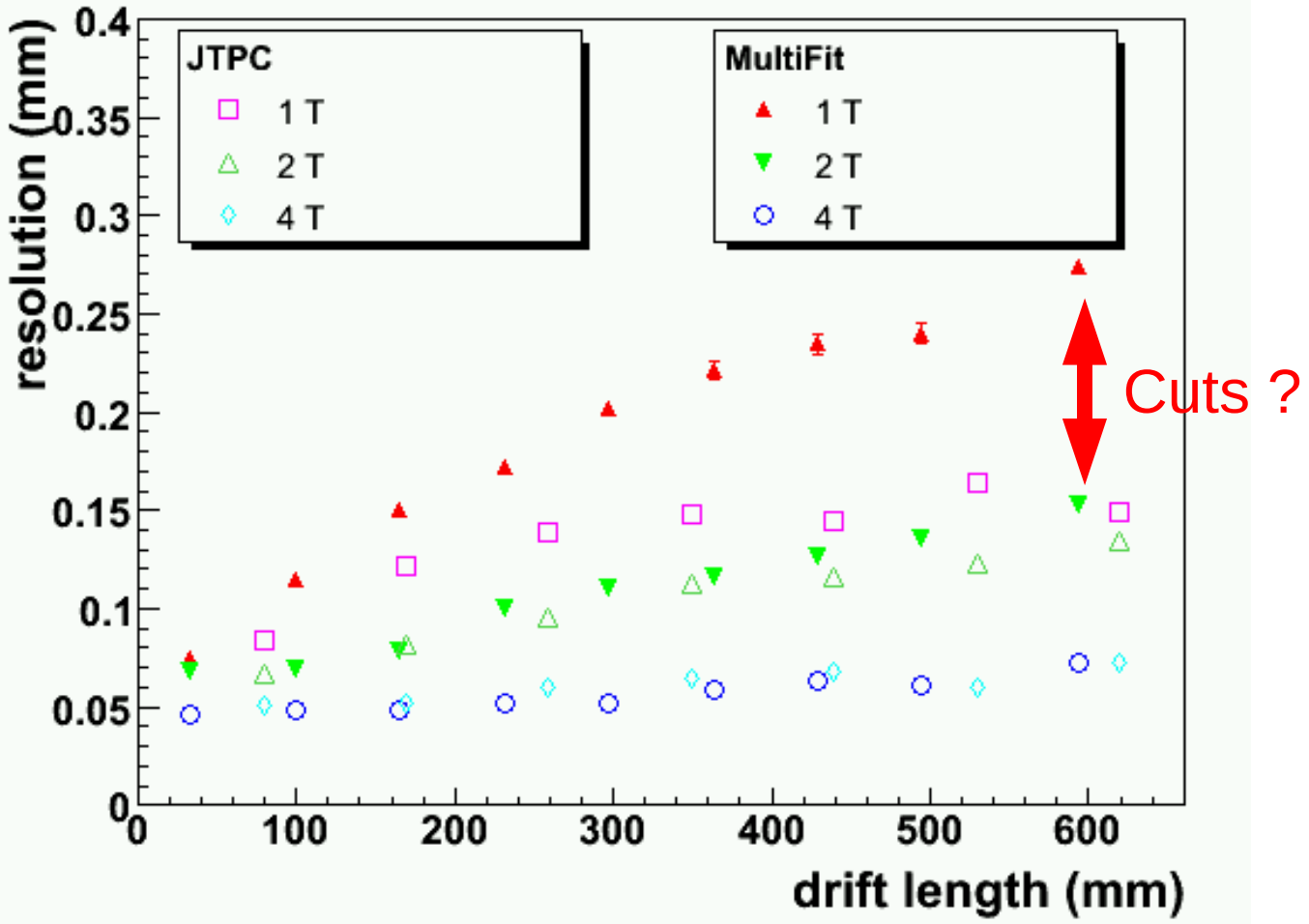
Resolution Before and After the Change

- improvement of resolution for P5 4T is amazing
- But what is the truth?
- further studies are needed





Resolution: MultiFit - JTPC



Geometry in LCIO

- Layout will be row based, for other layouts other reconstruction methods are needed (e.g. hexagonal)
- Coordinate System will be stored but will be hidden by use of different classes
- Same will be the case for pad shape
- Pad ID ≠ Channel ID
- Numbering (rows, pads) from increasing with r,phi / y,x

Summery & Outlook

- AdvancedCurvedFit: some progress was been made, but it is still not fully understood:
  - Influence of the noise value
  - Cuts, fit limits, etc.

- Writing code for layout API (in C++ & Java)
  - Use of LCGenericObject for storing in LCIO