



TPC analysis jamboree La Clarté-Dieu, Orsay

Not a summary,
Not really conclusions,
Most of all some remarks and questions

Program (quite flexible) with aim for many discussions

- **Monday 11 May, afternoon:**
status reports Alice, PID with T2K, PANDA, ILC LP tests with Micromegas and GEM
- **Tuesday 12 May:**
mostly gas gain fluctuations
- **Wednesday 13 May:**
mostly ion feedback (+gating), space charge, distortions
- **Thursday 14 May:**
distortions+corrections
- **Miscellaneous:**
Gridpix analysis, reconstruction methods, laser calibration

Bringing different communities together

- Alice, ILC, PANDA, T2K, (bit of STAR?)
- Unfortunately several people could not come
- We learned quite a bit from each other
(and have to study better further details)
- Follow up (at least for LCTPC collaboration):
 - more regular (shorter) analysis meetings
say 0.5-1 day by “phone” ?
 - jamboree-like, once per year ?
- Should we further “institutionalise” a collaboration?
- Many thanks to Paul for the organisation

Re: pixel readout

gas	E_{drift} (V/cm)	v_{drift} exp (cm/ μ sec)	v_{drift} measured (cm/ μ sec)
Ar 3% CF ₄ 2% IsoBut	200	7.5	4.3 \pm 0.4
Ar 30% CO ₂	470	1.2	1.2 \pm 0.1
Xe 30% CO ₂	1000 / 1400 / 1900	1.9 / 3.5 / 5	1.9 \pm 0.2 / 3.4 \pm 0.3 / 4.9 \pm 0.5
He 20% IsoBut	560	2.1	2.2 \pm 0.2
Ar 20% IsoBut	600	4.3	4.4 \pm 0.4

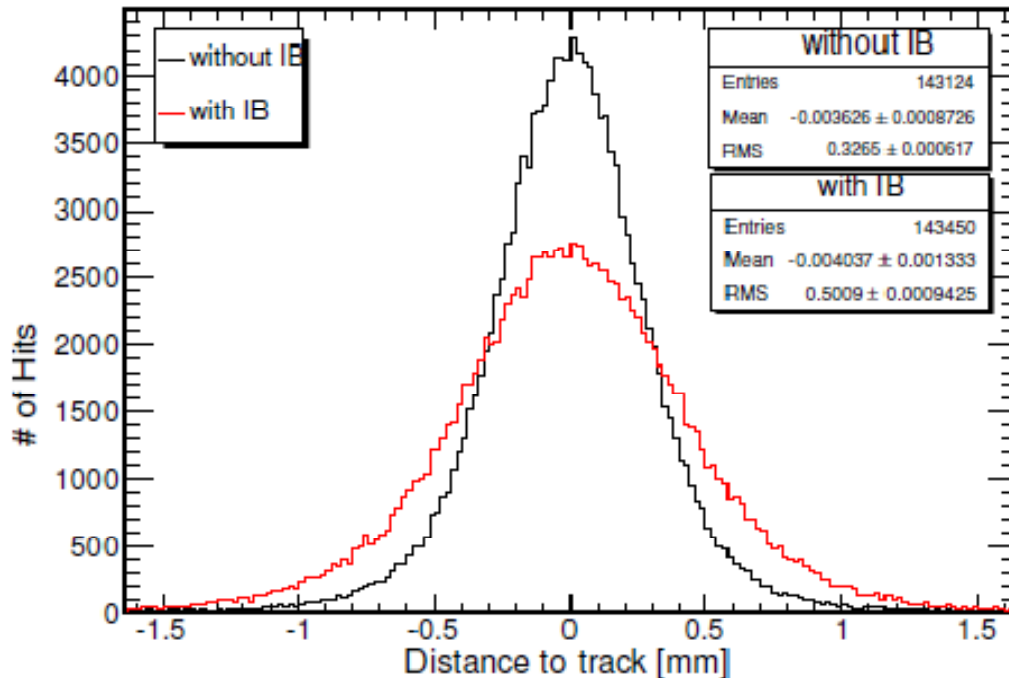
$$res^2 = \frac{pixel^2}{12} + D_t^2 z$$

For single-electron hits; $N_{\text{eff}} = 1$

gas	E_{drift} (V/cm)	D_t exp ($\mu\text{m}/\sqrt{\text{cm}}$)	D_t measured ($\mu\text{m}/\sqrt{\text{cm}}$)	$\sigma_{xy,0}$ (μm)
Ar 3% CF ₄ 2% IsoBut	200	290	138 \pm 2.5	35 \pm 11
Ar 30% CO ₂	470	148	80 \pm 2	24 \pm 7
Xe 30% CO ₂	1000	185	40 \pm 8	30 \pm 15
Xe 30% CO ₂	1400	103	134 \pm 3	23 \pm 11
Xe 30% CO ₂	1900	110	171 \pm 4	17 \pm 14
He 20% IsoBut	560	175	176 \pm 2	27 \pm 14

Re: influence from ion backflow

Martin Killenberg, ILC TPC



Spatial Resolution

Significantly reduced spatial resolution for high gas gain ($\sim 20,000$)

- $\Delta E < 50$ V/cm (20%)
(in PANDA case few V/cm)
- $300 \mu\text{m} \rightarrow 500 \mu\text{m}$
- gain $\sim 20,000$
- what was ion feedback fraction ?
- why only $300 \mu\text{m}$ without IB?
- huge effect, especially if resolution w.o. IB will be $100 \mu\text{m}$ or less

Can we make comparison between ILC sim. and Alice distortion calcs.?

Re: single-point resolutions

- ILC aims for 100 μm or less over 2.5 m drift length (with 3.5-4T B-field)
→ $\Delta (1/p_t) \sim 10^{-4}$ from TPC alone
which probably means understanding the distortions at the level 10-20 μm
- PANDA: 300 μm ; 1-3% @ 1 GeV
- Alice: 300-500 μm
→ $\Delta (1/p_t) \sim 5 \times 10^{-3}$ 5% @ 10 GeV

See you next time!