Analysis status of TB DESY 2014 in basf2

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Basic information
TB DESY, January 2014, 3-5 GeV/c electrons

Basic tasks:

- Full size sensor test

- Tuning of electronics (new developments in DEPFET readout)

- Combination of PXD with SVD (readout, ROI estimation, data storing)

- …

- DAQ sw:

    - Basf2 modification for the beam test:

        - Basf2 PXD+SVD real data readout

        - Basf2 data quality monitor for PXD+SVD (DQM)

        - Basf2 testbeam data analysis

        - Inclusion of AIDA telescopes in Basf2 for better tracking

Very successful beam test

Very intensive work

Very intensive work

Basic information
TB DESY, January 2014, 3-5 GeV/c electrons

Pixel/strip counting direction

Local coordinates uvw

Full TB setup

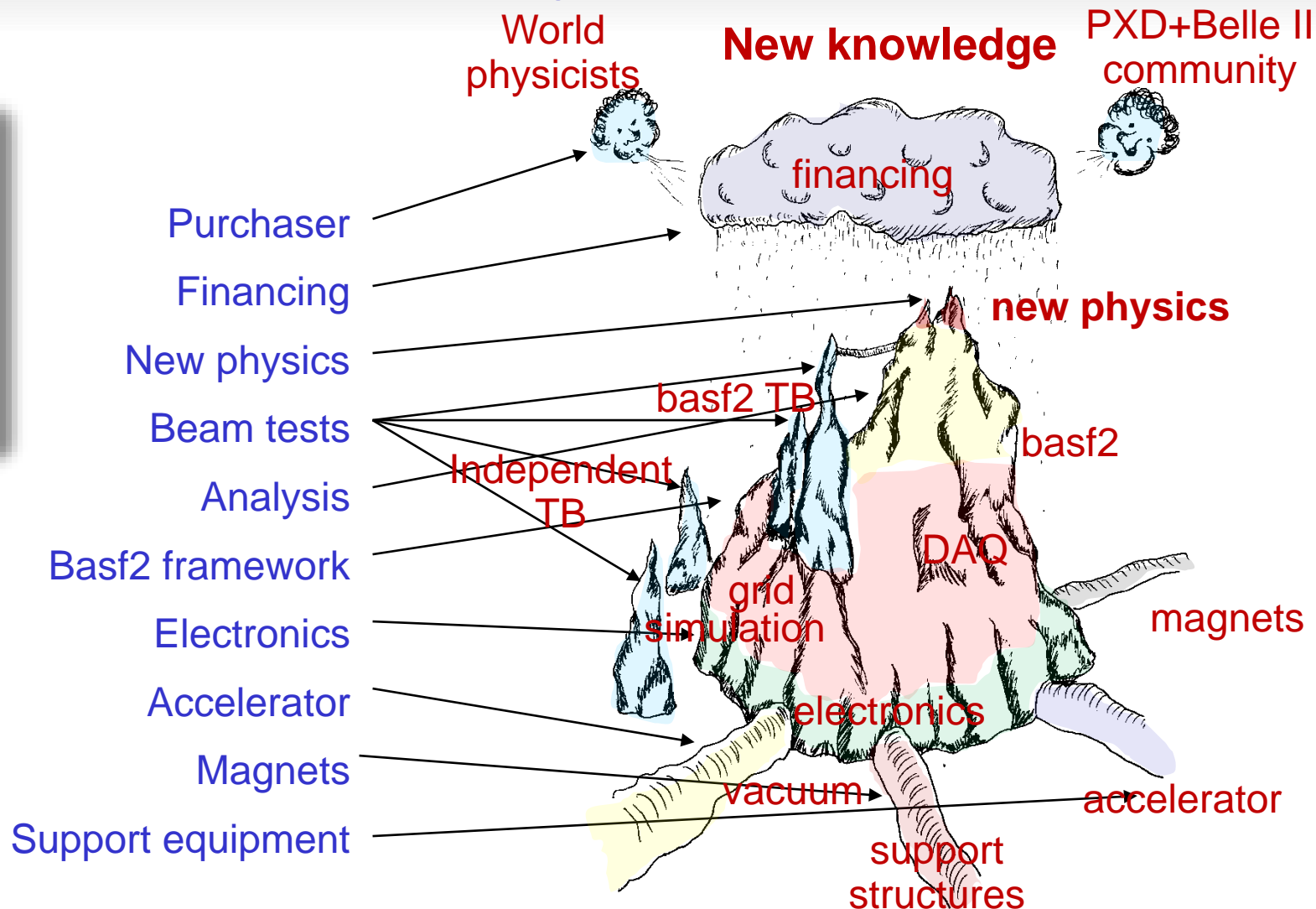Magnetic field

Coordinates xyz

PXD and SVD arrangement

Beam direction

Basic information

TB DESY, January 2014, 3-5 GeV/c electrons

**Role of beam tests for DEPFET PXD and for basf2 sw framework of Belle II**

World physicists

New knowledge

PXD+Belle II community

financing

Purchaser

Financing

new physics

New physics

basf2 TB

Beam tests

basf2

Analysis

Independent TB

DAQ

Basf2 framework

grid simulation

Electronics

magnets

Accelerator

electronics

Magnets

vacuum

accelerator

Support equipment

support structures

Basf2 is on top: collect data and look for physics

- raw data transfer,
- conversion,
- DQM,
- ordering,
- clustering,
- filtering, masking, corrections
- track recognition,
- fitting,
- alignment,
- fine fitting and residual distribution check,
- fine analysis,
- summary table creation,
- feedback to sub-detector groups
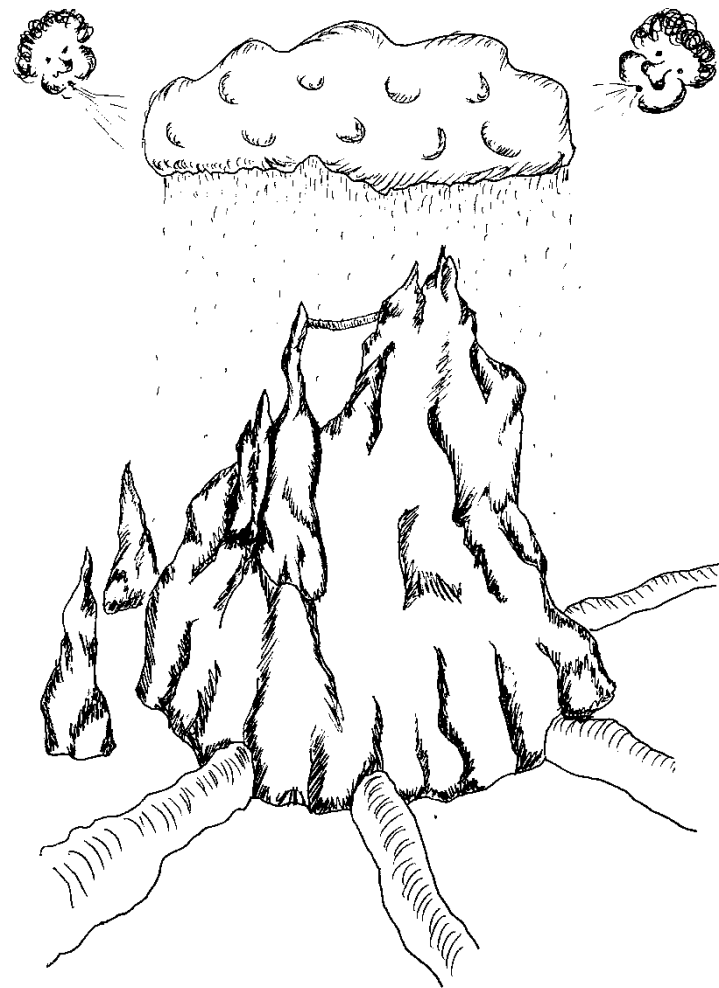
- Data handling very complicate business, unsupported up to now:
  - Format changes over beam test ongoing
  - Different types of raw data formats - sroot data not usable for longer-term storage, all converted to root.
- Merging with telescope data
  - Independent and different event numbering, data from VXD DAQ with events ordered randomly - bufferning needed.
  - TLU tag from EUDAQ unreliable, but we have timestamps from VXD and EUDAQ for sanity checks
  - Loss of synchronization observed after 20k events in several runs = low track yield. Currently looking for solution.

Clustering, filtering, masking, track recognition

- Clustering with digits later masked because fired

- Unknown dead pixels

- Telescopes: first PXD format of clusters, later freeze id in own format with special setting

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- Missing track finding module for TB

- Effective masking: crucial step for efficient following work

- Very poor yield of full tracks (less 1% of events)

- For 11 planes + SVD doubled: big multiplicity for just (few) cluster(s) @ plane

- Noisy large regions in SVD and PXD

- Seems OK with GBL and Kalman

- Work with GBL/Kalman
- Very specific for TB and seems very different from Belle II
- Data indicate large gain variations in PXD: more than 10%! Affects resolution properties of PXD

- Simulation OK
- Real data:
  - Not work yet
  - Missing good track candidate recognition
  - Unstable work with higher numbers of track candidates
  - Missing supporting structure for alignment
  - Missing database support

Summary table creation

1		VXD No.	Tel No.	Remark	Magnet	Energy	Size[Gbyte]	Status	SizeCoverted[Mbyte]
251	250	474	135		0.2	2			
252	251	475	136	No correlation	0.2	2	8	Bad, remove from analysis	0
253	252	478	-1	Small VXD correlation	0.2	4	10	OK	625
254	253	479	138	No or week correlation, Tel3Problem?	0.5	4	4	OK	204
255	254	480	139	Trigger missmatch	1	4			
256	255	481	-1						
257	256	486	-1						
258	257	489	-1						
259	258	492	-1	Bad SVD, no pXD	1	5		Bad, remove from analysis	0
260	259	493	-1	No digits, no pXD	1	4	14	Bad, remove from analysis	0
261	260	494	149		1	4			
262	261	497	-1	week PXD	1	4	16	OK	1732
263	262	498	154	week PXD, bad SVD	1	4	8	Bad, remove from analysis	0
264	263	499	-1	week PXD, bad SVD	1	4		Bad, remove from analysis	0
265	264	500	155	SVD-tel OK, bad PXD	1	4	8	OK	194
266	265	501	156	NOT USEABLE	1	4			
267	266	502	-1	NOT USEABLE					
268	267	503	-1	NOT USEABLE					
269	268	504	-1						
270	269	505	-1	Only SVD				OK	7.5
271	270	506	-1	SVD, very week PXD			2	OK	94
272	271	507	-1	NOT USEABLE	1	4	22		
273	272	508	-1	NOT USEABLE	1	5	14		
274	273	509	172	ible full correlations, PXD-Tel??? Tel3Proble	1	5	10	OK	153
275	274	510	173	Visible full correlations, PXD-Tel???	1	3	6	OK	223
276	275	511	174	Visible full correlations, PXD-Tel???	1	3	132	OK	2394
277	276	514	-1				20		
278	277	517	183	Tuning run Visible full correlations	0		20	OK	538

Summary table creation

VXD No.	Tel No.	Magnet	Energy	Size[Gbyte]	Converted[Mbyte]	AllEvents	Tracks	PXDMaskDig	LimTracks
470	131	0	3	12	373	213575	7146	421	2520
473	134	0	4	72	1768	845407	20456	1465	6945
479	138	0.5	4	4	204	103358	179	42	125
509	172	1	5	10	153	103840	343	57	268
510	173	1	3	6	223	148444	787	120	646
511	174	1	3	132	2394	1889454	877	122	745
517	183	0		20	538	300786	8804	337	3671
561	207	0	3	164	2933	1823856	41013	2317	19389
562	208	0	3	32	691	416312	15006	613	6354
577	215	0	5	2	149	66448	5642	343	1365
607	226	0	4	176	4168	2336534	15868	910	6763
636	230	0	4	78	1664	1076713	8421	835	2825
642	236	0	4	138	3609	2446653	8224	1036	2722

|	Yield %	TrYield %	MaskPXD %	Remark
470	1.2	3.3	5.9	Small full correlation
473	0.8	2.4	7.2	Small full correlation
479	0.1	0.2	23.5	No or week correlation, Tel3Problem?
509	0.3	0.3	16.6	Visible full correlations, PXD-Tel??? Tel3Problem?
510	0.4	0.5	15.2	Visible full correlations, PXD-Tel???
511	0.0	0.0	13.9	Visible full correlations, PXD-Tel???
517	1.2	2.9	3.8	Tuning run Visible full correlations
561	1.1	2.2	5.6	Visible full correlations, PXD-Tel???
562	1.5	3.6	4.1	Visible full correlations, PXD-Tel???
577	2.1	8.5	6.1	Visible full correlations, PXD-Tel???
607	0.3	0.7	5.7	Visible full correlations, PXD-Tel???
636	0.3	0.8	9.9	Visible full correlations, PXD-noised, With 5mm Al plate in front of PXD.
642	0.1	0.3	12.6	Visible full correlations, PXD-noised, With 5mm Al plate in front of PXD.

Standard outputs

PXD Hitmap
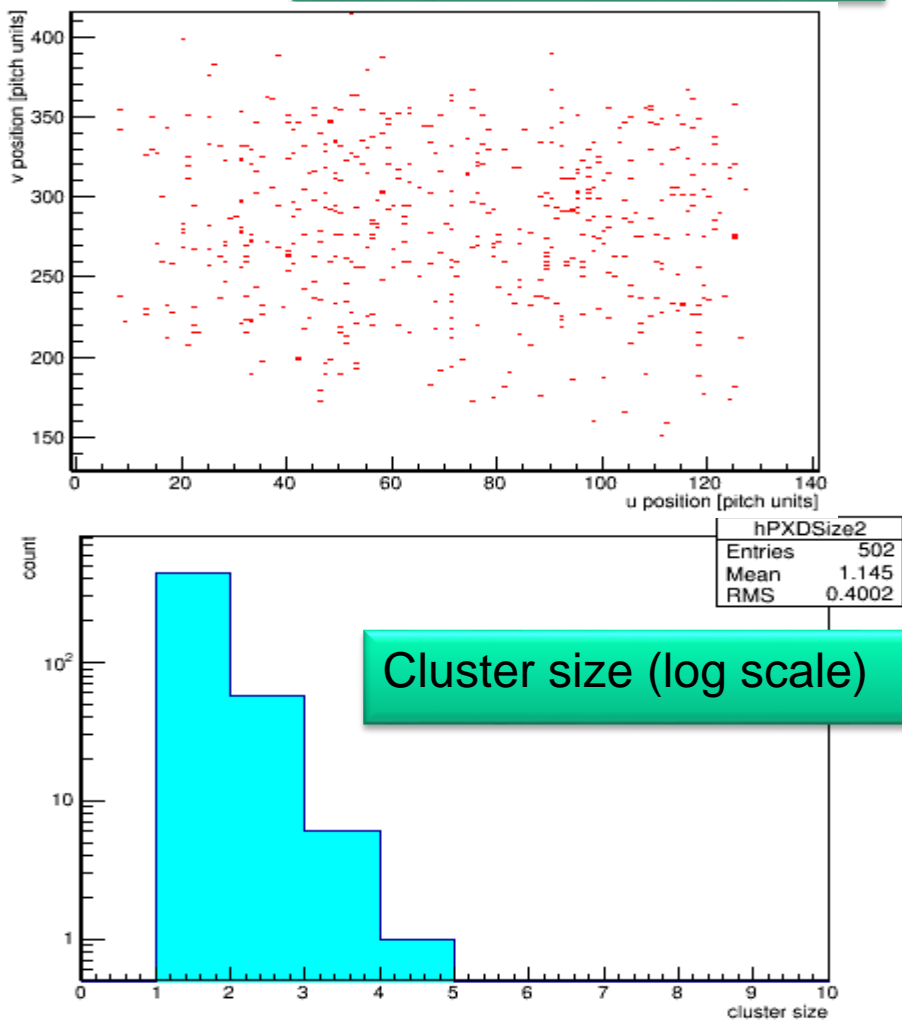
Cluster charge
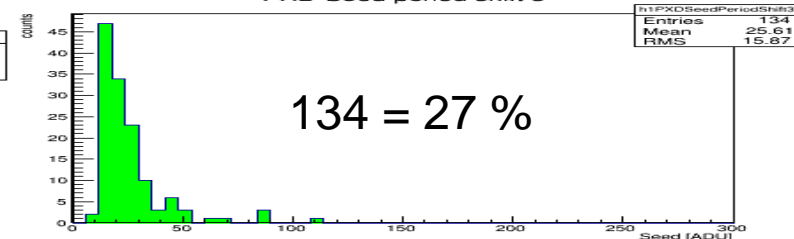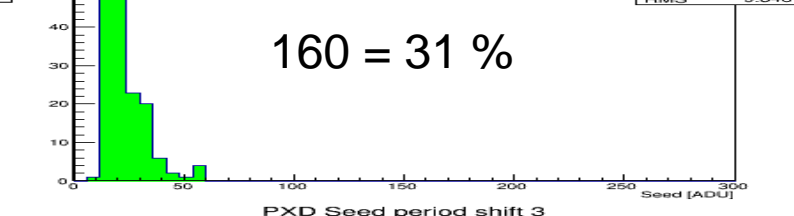
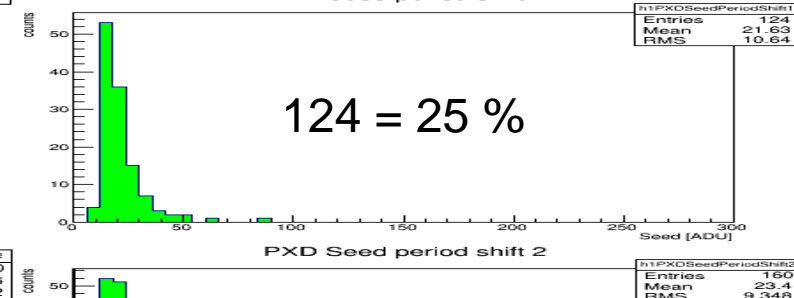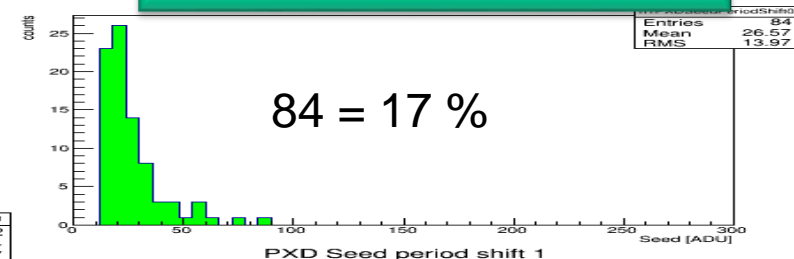Cluster size (log scale)
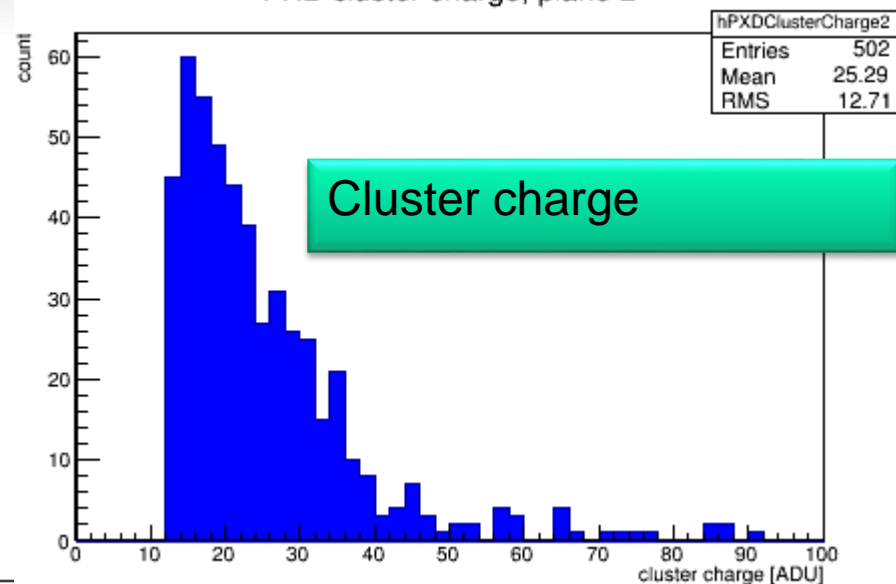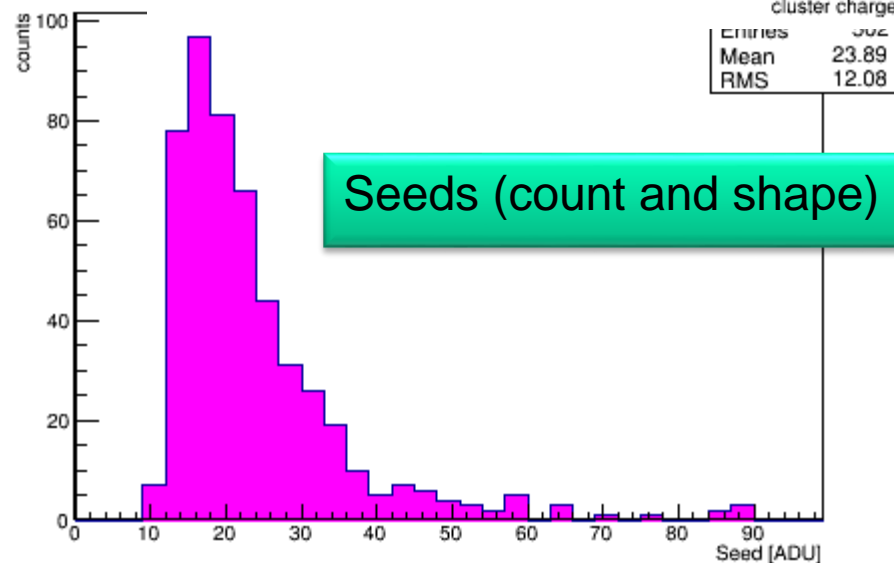
Seeds (count and shape)

Four rows period effects
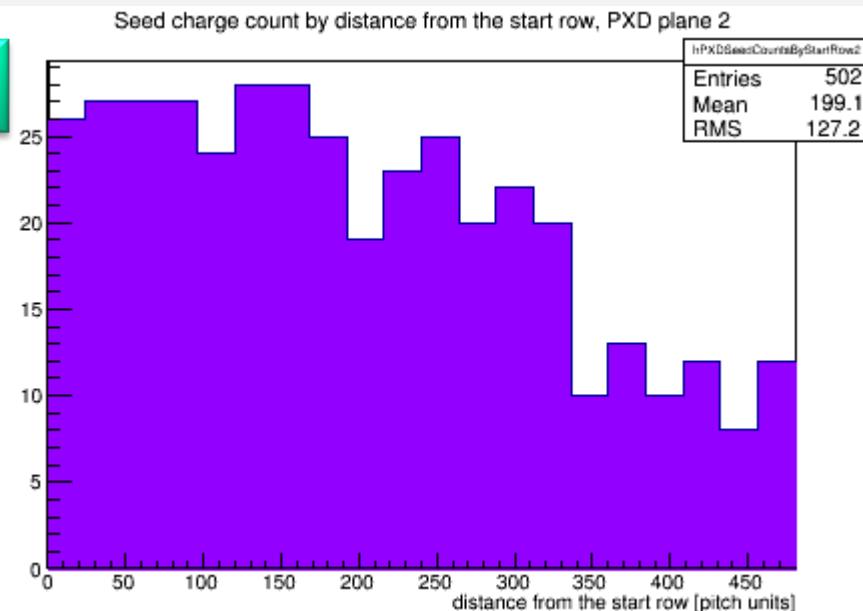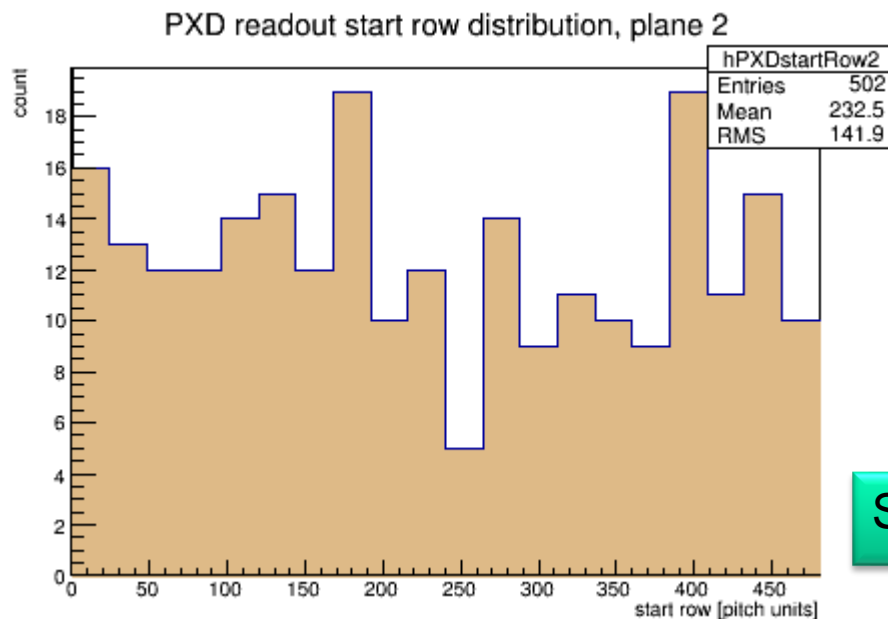
Digits (count and shape)
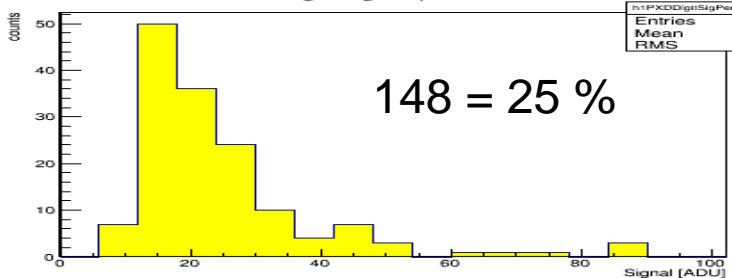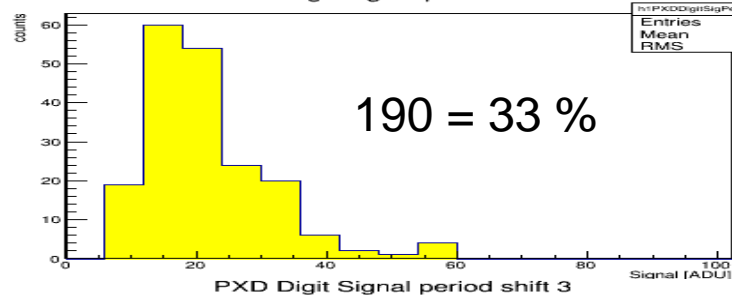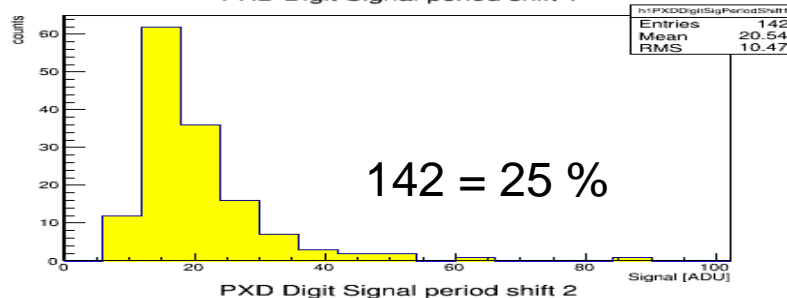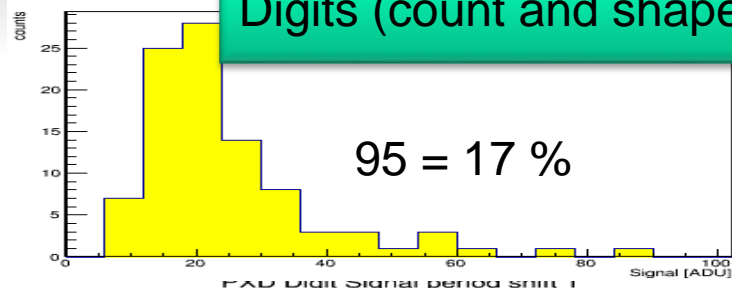
Seeds (count and shape)

Indication also from Benjamin for gain/efficiency variations between rows with period 4

95 = 17 %

84 = 17 %

142 = 25 %

124 = 25 %

190 = 33 %

160 = 31 %

148 = 25 %

134 = 27 %

Start row effect

Seed count: distance from start row

Timing of PXD was not optimal

Seed charge count by distance from the start row, PXD plane 2

hPXDSeedCountsByStartRow2	
Entries	502
Mean	199.1
RMS	127.2

PXD readout start row distribution, plane 2

hPXDstartRow2	
Entries	502
Mean	232.5
RMS	141.9

Start row distribution

Current issues

Extremely low yield of track recognition between VXD and Tels - loss of sync in telescopes

Complication with alignment and fitting, seems broken tracks or mixture on events

DAQ monitor checking of integrity of data between Tels and VXD over the time is needed

Need to be ready on next TB with particles

Summary

Logbook issues:

Current concept not work:

   missing information about news on beam test from subgroups

   not known which sub-detector is ready for DAQ and in which setting

   missing place for RunNo independent information

   important information share over e-mails (chatty, inefficient, easy lost, out of maillists

Proposals for improvement:

   use a common message board

   logbook info **connect to database**

   RunNo **connect to condition database** with mandatory fields:

      VXDRunNo, TelRunNo, Magnet, Energy,… , Comments

   (write correct and as much as possible detailed logbook -> comments)

   Mark **useful runs** with their usability for different tasks

   Share information over the group also for update of summary table of details for runs

   Interconnection of groups: PXD, SVD, Tel / Electronics, firmware, DAQ, basf2, physics…

Analysis issues:

Write **summary table** and **update it** over the analysis

Every file (RunNo) and its analysis should have its own **passport**:

info about stearing file, geometry, parameters, pixel/strip pedestal, noise, masking, gain, corrections, settings,…

Passport info collect in database and file contain pointers to database

Every analysis step should start with filling data into a form and immediately move it to database.
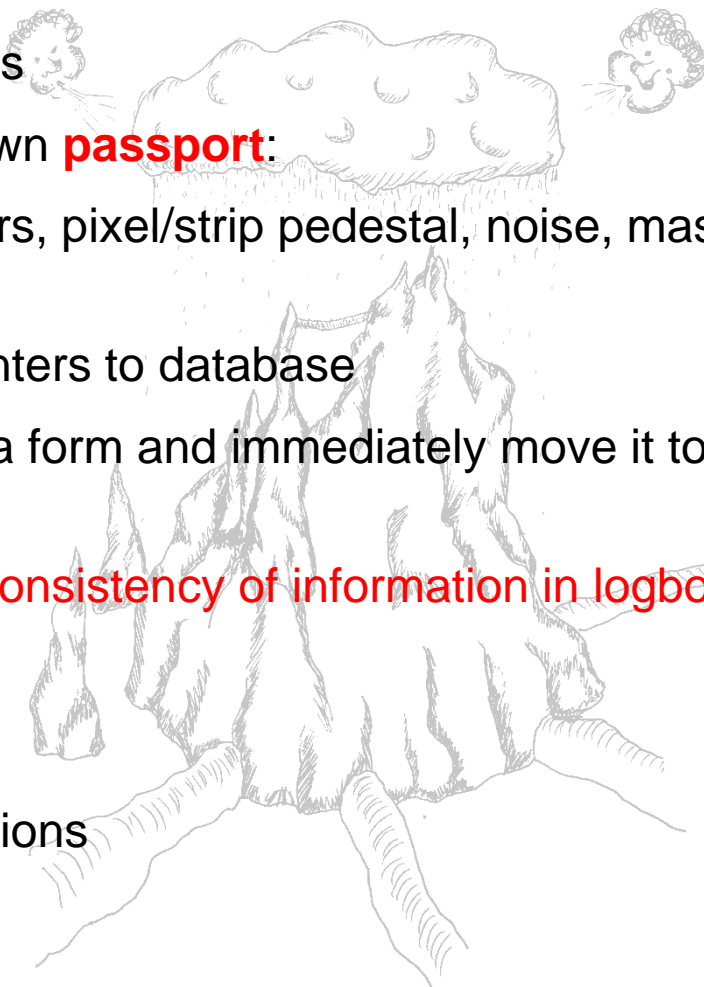
Role for non-expert shifters: to be on place, ensure consistency of information in logbook

Work is intensively ongoing:

DEPFET residual plots validate with simulations

DEPFET in-pixel analysis if statistics

PXD+SVD DQM improving to usable form

World physicists

New knowledge

PXD+Belle II community

financing

new physics

- feedback to sub-detector groups:
basf2: Camogli

PXD: this talk

Report on Computing meeting Camogli May 7, 2014

basf2 TB   phys. analysis

Independent TB

Tracking vertexing

basf2

alignment

clustering

grid

magnets

simulation

DAQ

Thank you for attention!

electronics

vacuum

accelerator

support structures