Scripts and Calibrations for Phase 2

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Scripts at KEK

- Scripts from the labs were not compatible with the BEAST setup
  - In the labs no DHC is used
  - Different DAQ has to be used
  - Triggering is different compared to the lab
- Most scripts support Multi DHC and Multi DHE setups
  - Parallel acquisition of data
  - Parallel analysis of data

Script Status

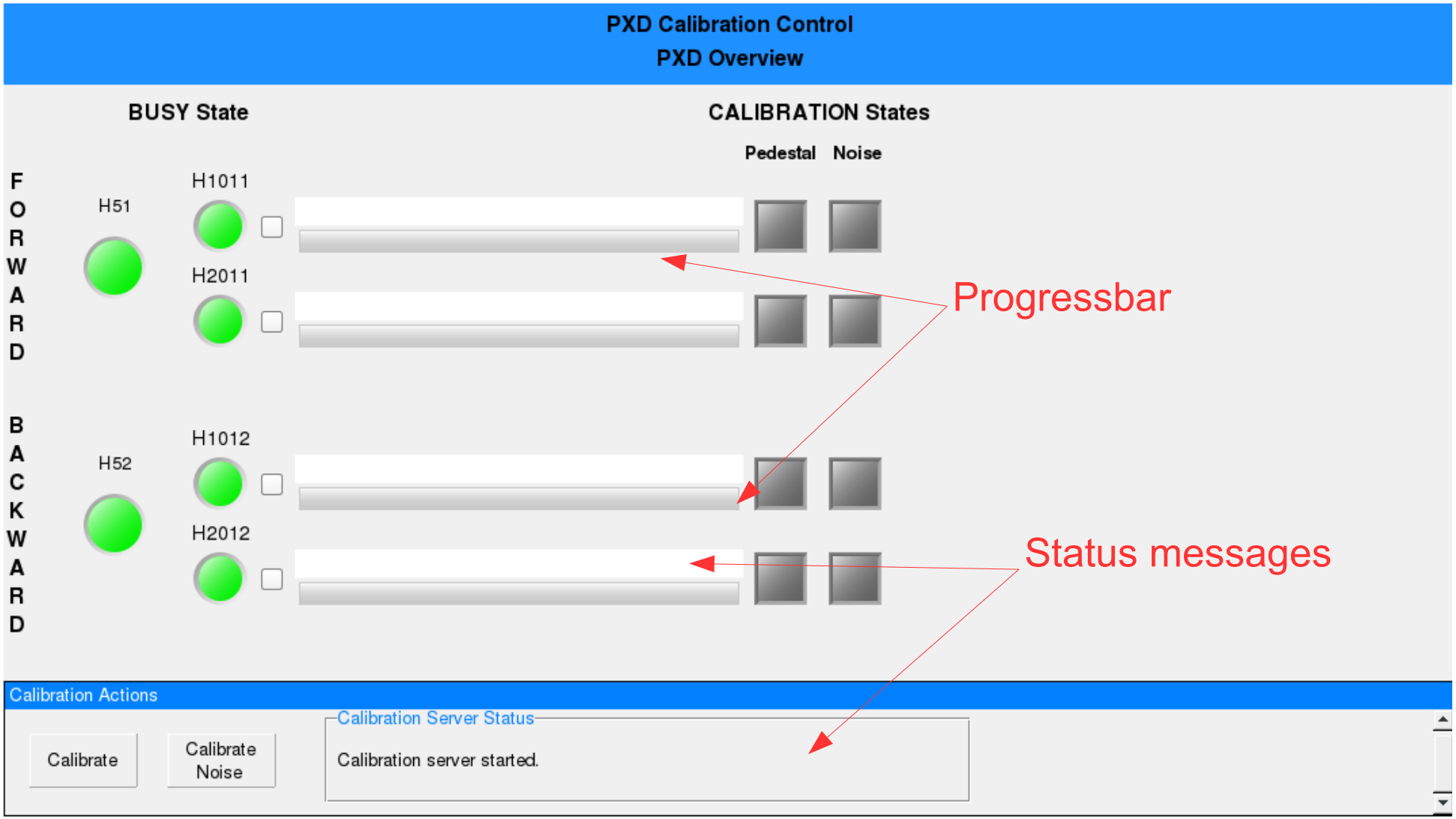
- Adjusted scripts (tested)
  - Pedestals
  - HS Links
  - DCD-DHP Data Link Delays
  - DCD-DHP Offset Link Delays
- Adjusted scripts (untested)
  - ADC Curves
  - Offset Calibration

Calibration IOC

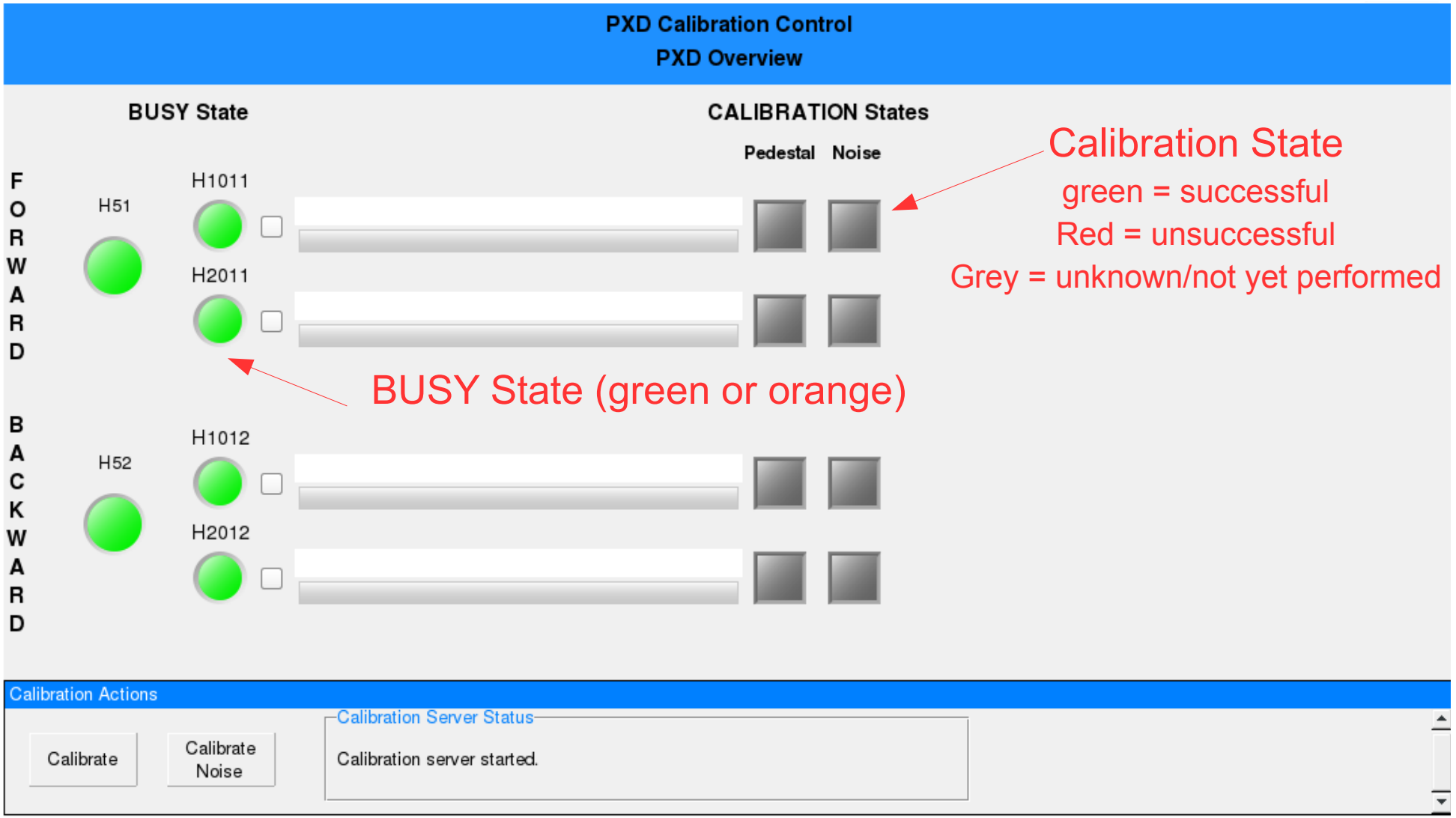
- In the current state, calibrations require experts to execute the necessary scripts
- To make this easier a Calibration IOC will be used, which is easy to use and ensures that measurements/analyses are executed correctly
  - e.g. prevent measurements on a module if the corresponding DHC is busy
- Interaction with this IOC over a simple GUI in CSS
- Perform Calibrations between runs when necessary (shifts in pedestals), time needed ~10min

Calibration IOC

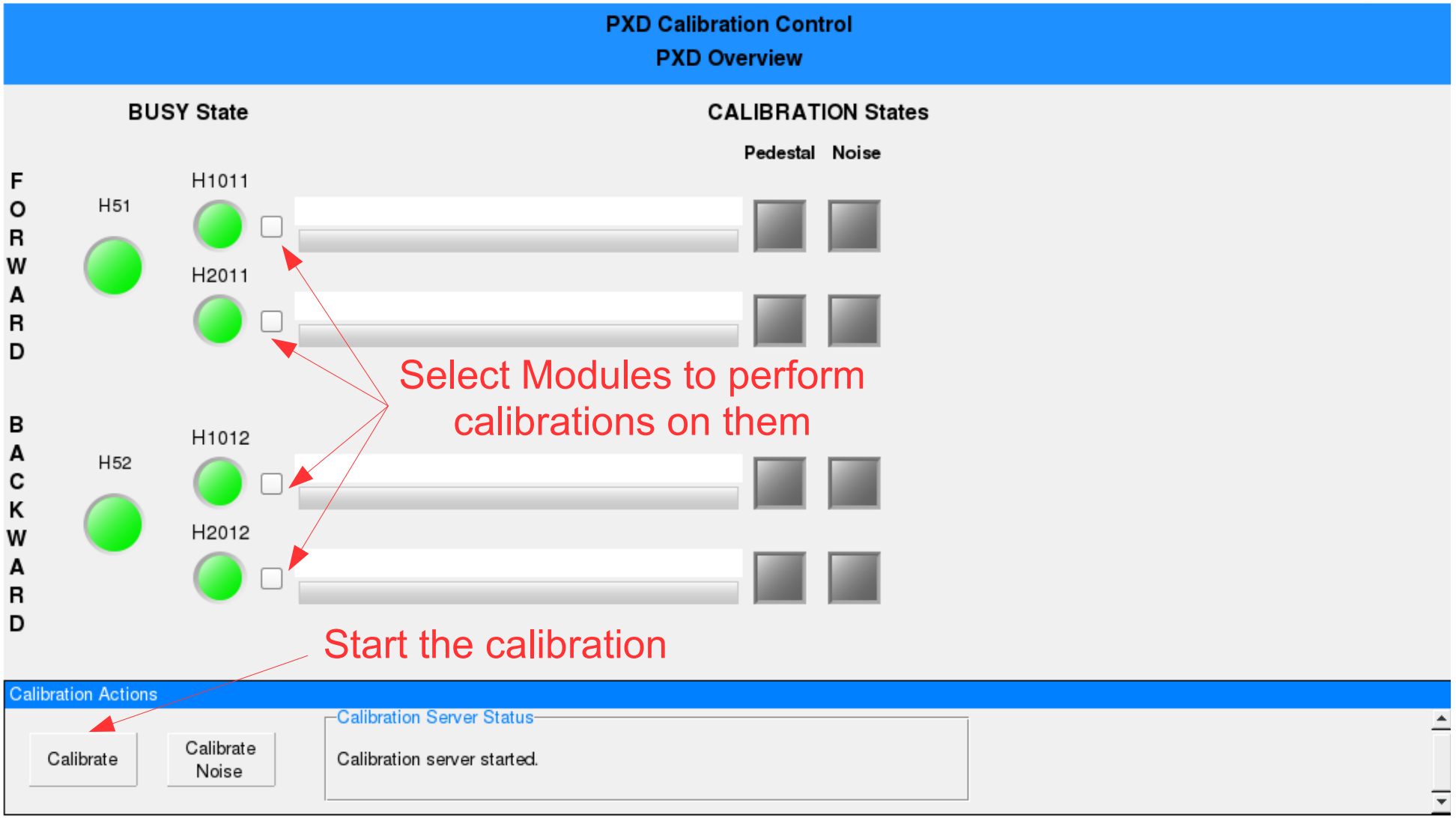
Calibration IOC



Calibration IOC



Calibration IOC



Calibration IOC

- Integrated features:
  - Pedestal measurement, noise masking and uploading
  - ZP data taking and hot pixel masking based on simple occupancy cut
- Planned features:
  - Interaction with DQM, if the occupancy gets too high make 'Calibration LED' red
  - Optimize DHP zero-suppression threshold together with the hot pixel mask
- Tested at DESY with „old“ PERSY setup (DHC + DHE + 1 module)

ELOG

- All scripts that are used at KEK use the elog functionality like it is done in the labs
  - Pedestals, delays, ... all stored in the elog
- https://elog.belle2.org/elog/Beast-II-Calibration/
- This elog is structured like the lab 'PXD-Mass-Testing' elog

- For the global Runs, there is a separate elog:
- https://elog.belle2.org/elog/Beast-II-PXD-Runs/
- This elog is filled automatically by a small server, which monitors the runstatus PV
  - New entry for each run

Calibration ELOG

Home | general | Software/Computing | DAQ | Beast | PXD | VXD | CDC | SVD | ECL | ARICH | PXD-SVD testbeam
PXD-Mass-Testing | PERSY | Beast-II-Commissioning | Beast-II-Calibration | Beast-II-PXD-Runs

ELOG for PXD Beast II calibration measurements and analyses, Page 1 of 37

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Full | Summary | Threaded -- All entries -- -- Type -- 727 Entries

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ID	Date	Author	Category	Type	Device	Module	Moduletype	CommitID	Text	
729	2018/04/ 3 Tue 16:46 UTC	pxdbonndaq	Analysis	Pedestal Analysis	pxd9	W46_IB	ib	55	Pedestal Analysis started at Tue, 03 Apr 2018 16:46:05. Analysis of 1000 frames of pedestal data:	6x
728	2018/04/ 3 Tue 16:46 UTC	pxdbonndaq	Analysis	Pedestal Analysis	pxd9	W37_OB1	ob	55	Pedestal Analysis started at Tue, 03 Apr 2018 16:45:59. Analysis of 1000 frames of pedestal data:	6x
727	2018/04/ 3 Tue 16:45 UTC	pxdbonndaq	Analysis	Pedestal Analysis	pxd9	W37_IF	if	55	Pedestal Analysis started at Tue, 03 Apr 2018 16:45:53. Analysis of 1000 frames of pedestal data:	6x
726	2018/04/ 3 Tue 16:45 UTC	pxdbonndaq	Analysis	Pedestal Analysis	pxd9	W37_OF1	of	55	Pedestal Analysis started at Tue, 03 Apr 2018 16:45:46. Analysis of 1000 frames of pedestal data:	6x
725	2018/04/ 3 Tue 16:42 UTC	pxdbonndaq	Scan	Pedestal Scan	None	None	None	55	Pedestal Scan started at Tue, 03 Apr 2018 16:41:26.	
724	2018/04/ 3 Tue 16:27 UTC	pxdbonndaq	Analysis	Pedestal Analysis	pxd9	W46_IB	ib	55	Pedestal Analysis started at Tue, 03 Apr 2018 16:27:32. Analysis of 1000 frames of pedestal data:	6x
723	2018/04/ 3 Tue 16:27 UTC	pxdbonndaq	Analysis	Pedestal Analysis	pxd9	W37_OB1	ob	55	Pedestal Analysis started at Tue, 03 Apr 2018 16:27:26. Analysis of 1000 frames of pedestal data:	6x
722	2018/04/ 3 Tue 16:27 UTC	pxdbonndaq	Analysis	Pedestal Analysis	pxd9	W37_IF	if	55	Pedestal Analysis started at Tue, 03 Apr 2018 16:27:19. Analysis of 1000 frames of pedestal data:	6x
721	2018/04/ 3 Tue 16:27 UTC	pxdbonndaq	Analysis	Pedestal Analysis	pxd9	W37_OF1	of	55	Pedestal Analysis started at Tue, 03 Apr 2018 16:27:12. Analysis of 1000 frames of pedestal data:	6x
720	2018/04/ 3 Tue 16:23 UTC	pxdbonndaq	Scan	Pedestal Scan	None	None	None	55	Pedestal Scan started at Tue, 03 Apr 2018 16:23:12.	
719	2018/04/ 3 Tue 16:11 UTC	pxdbonndaq	Analysis	Pedestal Analysis	pxd9	W46_IB	ib	55	Pedestal Analysis started at Tue, 03 Apr 2018 16:11:43. Analysis of 1000 frames of pedestal data:	6x
718	2018/04/ 3 Tue 16:11 UTC	pxdbonndaq	Analysis	Pedestal Analysis	pxd9	W37_OB1	ob	55	Pedestal Analysis started at Tue, 03 Apr 2018 16:11:34. Analysis of 1000 frames of pedestal data:	6x
717	2018/04/ 3 Tue 16:11 UTC	pxdbonndaq	Analysis	Pedestal Analysis	pxd9	W37_IF	if	55	Pedestal Analysis started at Tue, 03 Apr 2018 16:11:21. Analysis of 1000 frames of pedestal data:	6x
									Pedestal Analysis started at Tue, 03 Apr 2018	

Calibration ELOG

ELOG for PXD Beast II calibration measurements and analyses

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Message ID: **729** Entry time: **2018/04/ 3 Tue 16:46 UTC**

Author:	pxdbonndaq
Category:	Analysis
Type:	Pedestal Analysis
Device:	pxd9
Module:	W46_IB
Moduletype:	ib
CommitID:	55

```
Pedestal Analysis started at Tue, 03 Apr 2018 16:46:05.
Analysis of 1000 frames of pedestal data:

For the analysis/plotting pxd9 mapping was used.
The unconnected channels were masked.

The noise masking option was enabled and the noise threshold was set to 2.5 ADU.
201 channels were masked on the whole sensor because of high noise.

The offline common mode correction was enabled and the cmc threshold was set to 5 ADU.
The analog common mode correction on DCD 1 was Off
The analog common mode correction on DCD 2 was Off
The analog common mode correction on DCD 3 was Off
The analog common mode correction on DCD 4 was Off
The offset correction on DHP 1 was Off
The offset correction on DHP 2 was Off
The offset correction on DHP 3 was Off
The offset correction on DHP 4 was Off

Detailed information per DCD:
DCD 1:
50 channels showed an ADU value of 1, 6 an ADU value of 255.
The total spread is 258.7605185546875, the median is 73.0684951171875 with a standard deviation of 33.28406593941338
DCD 2:
12 channels showed an ADU value of 1, 3 an ADU value of 255.
The total spread is 258.880009765625, the median is 101.6307880859375 with a standard deviation of 36.57230755724755
DCD 3:
22 channels showed an ADU value of 1, 2 an ADU value of 255.
The total spread is 258.880009765625, the median is 95.4731318359375 with a standard deviation of 39.65246332829205
DCD 4:
46 channels showed an ADU value of 1, 4 an ADU value of 255.
The total spread is 258.598072265625, the median is 81.20418669035486 with a standard deviation of 38.216351065130034

Data is stored on pxdbonndaq in /data/BEAST/pedestal_scan/2018_04_04_003/H1132.


Result: noisy_channel 0.11% A
Result: channels_out_of_dynamic_range 0.08% F
Pedestal Analysis stopped at Tue, 03 Apr 2018 16:46:07.
Total time passed: 0:00:02
```

Calibration ELOG

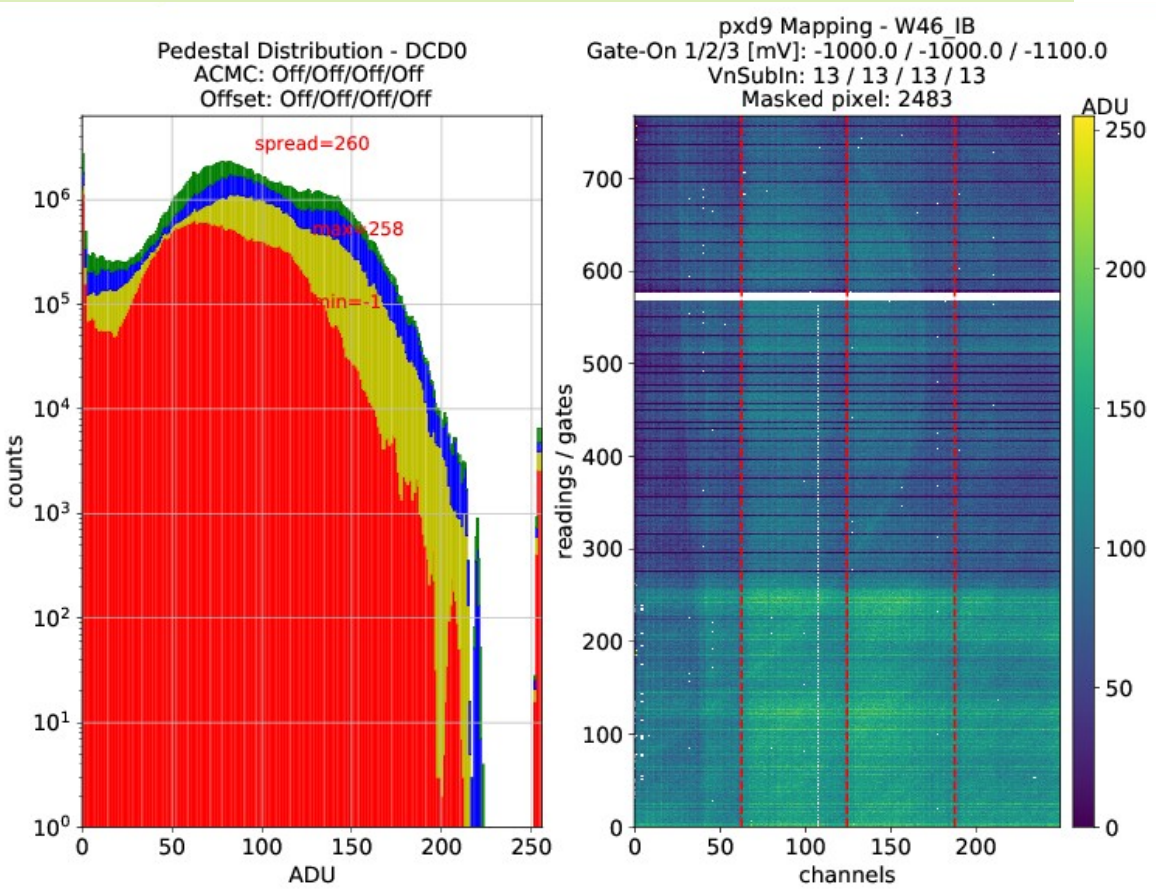
ELOG for PXD Beast II calibration measurements and analyses

List | New | Edit | Delete | Reply | Duplicate | Find | Logout | Help

Message ID: **729** Entry time: **2018/04/ 3 Tue 16:46 UTC**

Author:	pxdbonndaq
Category:	Analysis
Type:	Pedestal Analysis
Device:	pxd9
Module:	W46_IB
Moduletype:	ib
CommitID:	55

```
Pedestal Analysis started at Tue, 03 Apr 2018 16:46:05.
Analysis of 1000 frames of pedestal data:

For the analysis/plotting pxd9 mapping was used.
The unconnected channels were masked.

The noise masking option was enabled and the noise threshold was set to
201 channels were masked on the whole sensor because of high noise.

The offline common mode correction was enabled and the cmc threshold was
The analog common mode correction on DCD 1 was Off
The analog common mode correction on DCD 2 was Off
The analog common mode correction on DCD 3 was Off
The analog common mode correction on DCD 4 was Off
The offset correction on DHP 1 was Off
The offset correction on DHP 2 was Off
The offset correction on DHP 3 was Off
The offset correction on DHP 4 was Off

Detailed information per DCD:
DCD 1:
50 channels showed an ADU value of 1, 6 an ADU value of 255.
The total spread is 258.7605185546875, the median is 73.0684951171875 wi
DCD 2:
12 channels showed an ADU value of 1, 3 an ADU value of 255.
The total spread is 258.880009765625, the median is 101.6307880859375 wi
DCD 3:
22 channels showed an ADU value of 1, 2 an ADU value of 255.
The total spread is 258.880009765625, the median is 95.4731318359375 witl
DCD 4:
46 channels showed an ADU value of 1, 4 an ADU value of 255.
The total spread is 258.598072265625, the median is 81.20418669035486 wi

Data is stored on pxdbonndaq in /data/BEAST/pedestal_scan/2018_04_04_003

Result: noisy_channel 0.11% A
Result: channels_out_of_dynamic_range 0.08% F
Pedestal Analysis stopped at Tue, 03 Apr 2018 16:46:07.
Total time passed: 0:00:02
```



Run ELOG

Home | general | Software/Computing | DAQ | Beast | PXD | VXD | CDC | SVD | ECL | ARICH | PXD-SVD testbeam
PXD-Mass-Testing | PERSY | Beast-II-Commissioning | Beast-II-Calibration | Beast-II-PXD-Runs

ELOG for PXD Beast II runs, Page 55 of 60

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Full | Summary | Threaded

1197 Entries

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ID	Date	Author	ExperimentNumber	RunNumber	StartTime	EndTime	RunDuration	CommitID	RunStatus	Text
117	2018/02/17 Sat 15:41 UTC	schree	2	273	2018/02/18 Sun 00:43 UTC	2018/02/18 Sun 00:44 UTC	0:00:50	39	ABORTED	Run was started at 2018-02-18 00:43:37.701290 Run was stopped at 2018-02-18 00:44:27.909628 Experiment: 2
116	2018/02/17 Sat 15:37 UTC	schree	2	272	2018/02/18 Sun 00:39 UTC	2018/02/18 Sun 00:40 UTC	0:00:58	39	ABORTED	Run was started at 2018-02-18 00:39:40.578360 Run was stopped at 2018-02-18 00:40:39.080837 Experiment: 2
115	2018/02/17 Sat 15:33 UTC	schree	2	271	2018/02/18 Sun 00:35 UTC	2018/02/18 Sun 00:35 UTC	0:00:46	39	ABORTED	Run was started at 2018-02-18 00:35:11.961571 Run was stopped at 2018-02-18 00:35:58.733398 Experiment: 2
114	2018/02/17 Sat 15:30 UTC	schree	2	270	2018/02/18 Sun 00:31 UTC	2018/02/18 Sun 00:32 UTC	0:01:12	39	ABORTED	Run was started at 2018-02-18 00:31:37.130711 Run was stopped at 2018-02-18 00:32:49.612373 Experiment: 2
113	2018/02/17 Sat 15:27 UTC	schree	2	269	2018/02/18 Sun 00:29 UTC	2018/02/18 Sun 00:30 UTC	0:00:59	39	ABORTED	Run was started at 2018-02-18 00:29:11.472536 Run was stopped at 2018-02-18 00:30:10.821527 Experiment: 2
112	2018/02/17 Sat 15:17 UTC	schree	2	268	2018/02/18 Sun 00:19 UTC	2018/02/18 Sun 00:20 UTC	0:01:16	39	STOPPED	Run was started at 2018-02-18 00:19:31.791892 Run was stopped at 2018-02-18 00:20:48.409364 Experiment: 2
111	2018/02/17 Sat 15:15 UTC	schree	2	267	2018/02/18 Sun 00:16 UTC	2018/02/18 Sun 00:17 UTC	0:01:04	39	STOPPED	Run was started at 2018-02-18 00:16:52.318218 Run was stopped at 2018-02-18 00:17:56.628202 Experiment: 2
110	2018/02/17 Sat 15:04 UTC	schree	2	266	2018/02/18 Sun 00:06 UTC	2018/02/18 Sun 00:07 UTC	0:01:03	39	ABORTED	Run was started at 2018-02-18 00:06:03.925731 Run was stopped at 2018-02-18 00:07:07.498753 Experiment: 2
109	2018/02/17 Sat 15:01 UTC	schree	2	265	2018/02/18 Sun 00:02 UTC	2018/02/18 Sun 00:04 UTC	0:01:51	39	ABORTED	Run was started at 2018-02-18 00:02:21.499751 Run was stopped at 2018-02-18 00:04:13.382971 Experiment: 2
108	2018/02/17 Sat 14:56 UTC	schree	2	264	2018/02/17 Sat 23:44 UTC	2018/02/17 Sat 23:59 UTC	0:15:21	39	STOPPED	Run was started at 2018-02-17 23:44:02.046233 Run was stopped at 2018-02-17 23:59:23.811570 Experiment: 2
107	2018/02/17 Sat 14:35 UTC	schree	2	260	2018/02/17 Sat 23:25 UTC	2018/02/17 Sat 23:37 UTC	0:12:29	39	STOPPED	Run was started at 2018-02-17 23:25:20.653921 Run was stopped at 2018-02-17 23:37:50.274700 Experiment: 2
106	2018/02/17 Sat 14:20 UTC	schree	2	258	2018/02/17 Sat 23:10 UTC	2018/02/17 Sat 23:23 UTC	0:12:13	39	UNKNOWN	Run was started at 2018-02-17 23:10:50.069620 Run was stopped at 2018-02-17 23:23:03.283132 Experiment: 2
105	2018/02/17 Sat 14:06 UTC	schree	2	255	2018/02/17 Sat 22:26 UTC	2018/02/17 Sat 23:09 UTC	0:42:17	39	STOPPED	Run was started at 2018-02-17 22:26:46.715293 Run was stopped at 2018-02-17 23:09:04.660059 Experiment: 2
104	2018/02/17 Sat 13:22 UTC	schree	2	254	2018/02/17 Sat 22:18 UTC	2018/02/17 Sat 22:25 UTC	0:06:32	39	ABORTED	Run was started at 2018-02-17 22:18:53.150696 Run was stopped at 2018-02-17 22:25:25.477872 Experiment: 2

Run-ELOG

- Currently:
  - Run start/stop time, run length, temperatures of the DHPs, commit id, trigger rates of the DHEs
- Planned:
  - Status of other Subdetectors (included or not) --> Need access to the NSM variables to do that
  - Upload DQM plots with the elog entries