W37_OB1 BEAST module

Botho Paschen for DEPFET

2nd August 2017

DEPFET
Active Pixel Detector

W37_OB1 BEAST module
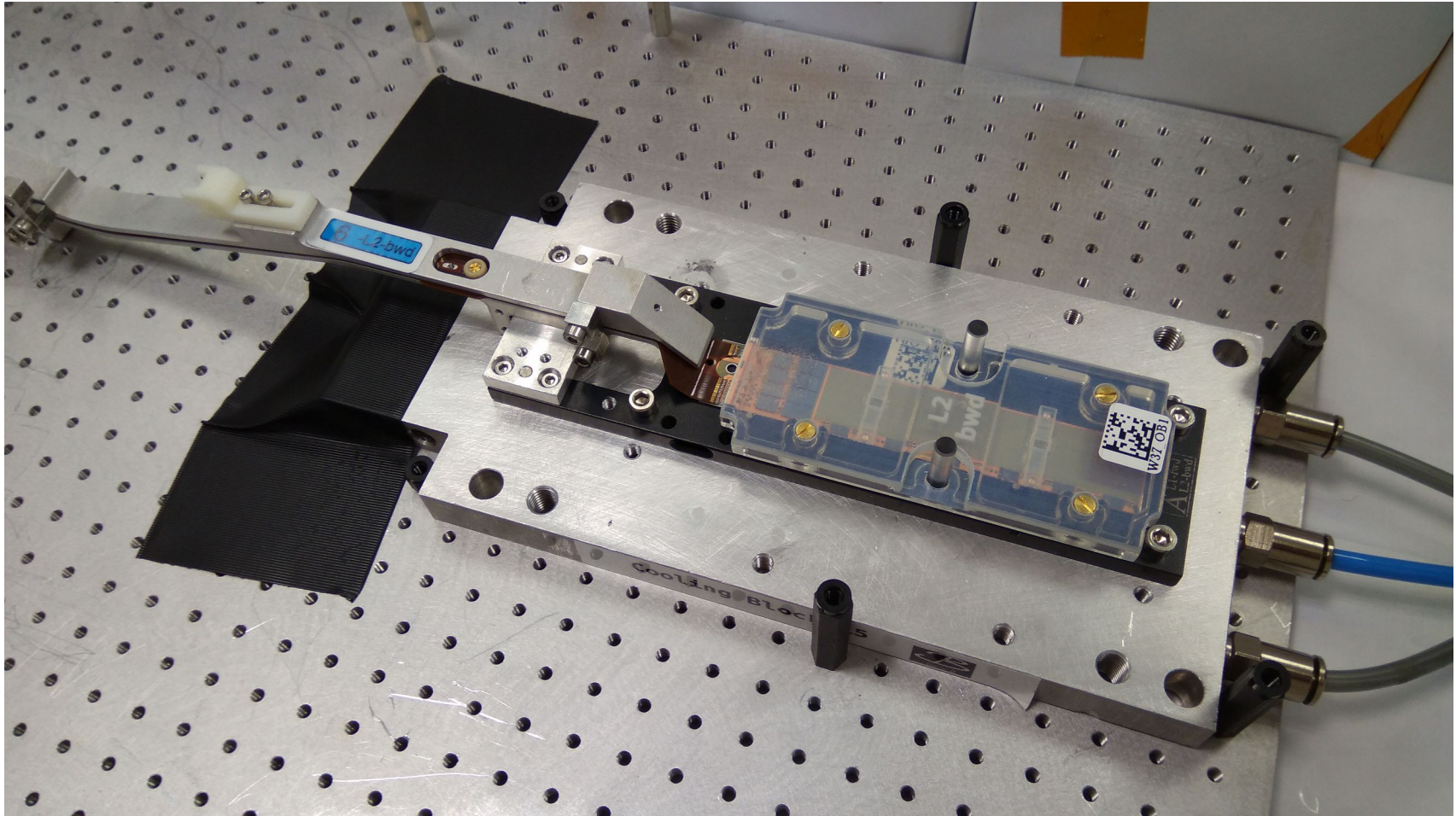
Routine operation:
- 15 degree water cooled
- vacuum on
- for source tests: inner cover removed

ALL tests performed at nominal **GCK frequency (76 MHz)**

Standard parameters

- HS links:
  - Bias = 225
  - Biasd = 125
  - Delay = 0
- DCD:
  - Amplow = 275 mV
  - Refin = 725 mV
  - Ipsource = 85
  - Ipsource_middle = 82
  - Ipsource2 = 80
  - IFBPBias = 75
  - EN = 90
- DCD data delays
  - Global = 0
  - Local = 4,5
- DCD offset delays
  - offset_frame_sync_dly = 0
  - offset_des_dly = 8
  - offset_dcd_dlys = 0
- Voltages:
  - Clear-On = 19 V
  - Clear-Off = 5 V
  - Gate-Off = 5 V
  - Source = 6 V
  - CCG = 0 V
  - Guard = 5 V
  - Bulk = 10 V
  - (HV = 70 V)
  - (Drift = 5 V)
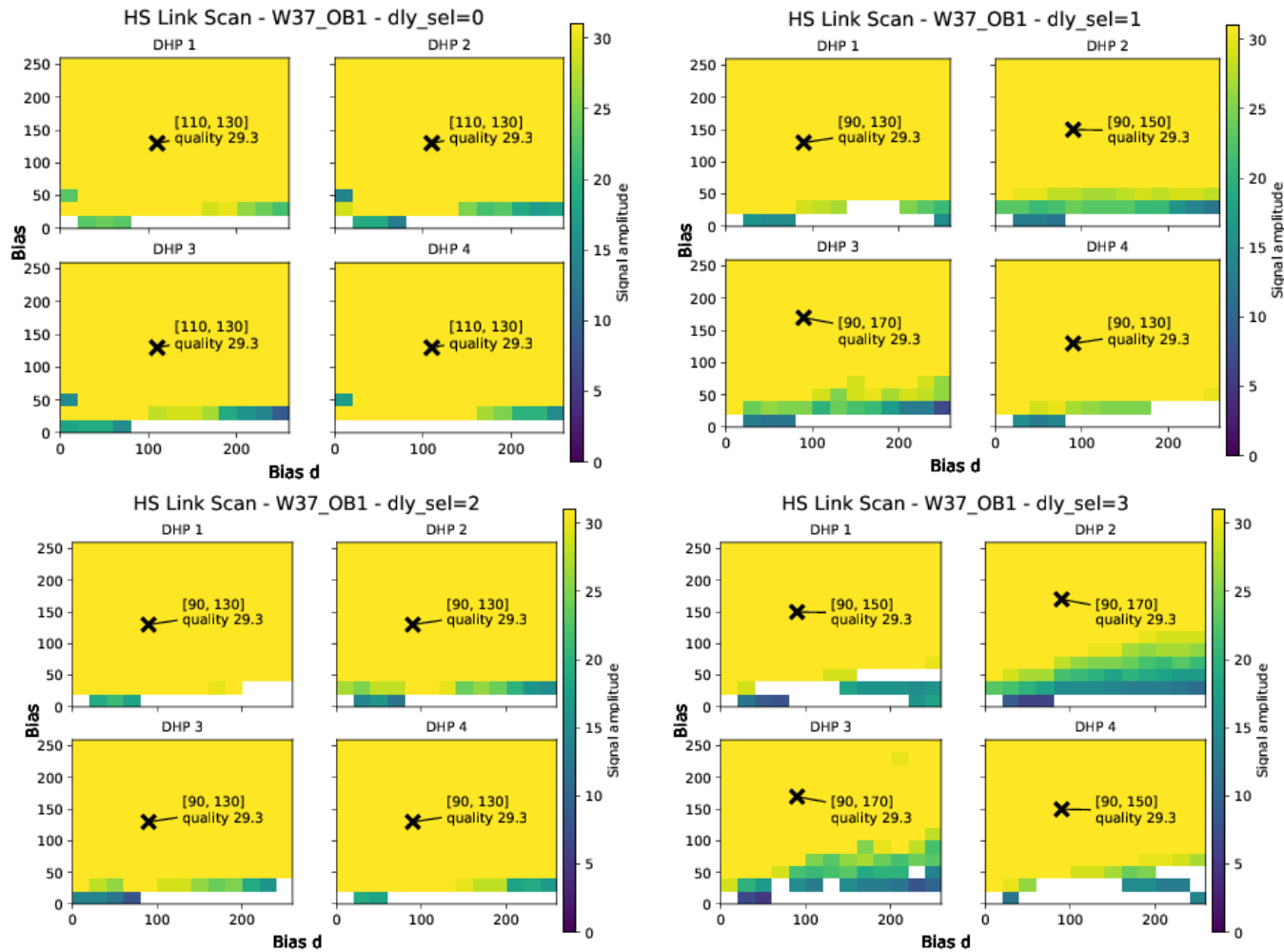 - (Gate-On = - 2.5 V)

DHPT Temperature measurement

Temperature in C

Measurment:
iref_trimming = 8
Nbits = 15
Gain = 12
Vrp = 4

DHP 1
DHP 2
DHP 3
DHP 4

time

HS link scan 1m Infiniband

https://elog.belle2.org/elog/PXD-Mass-Testing/233
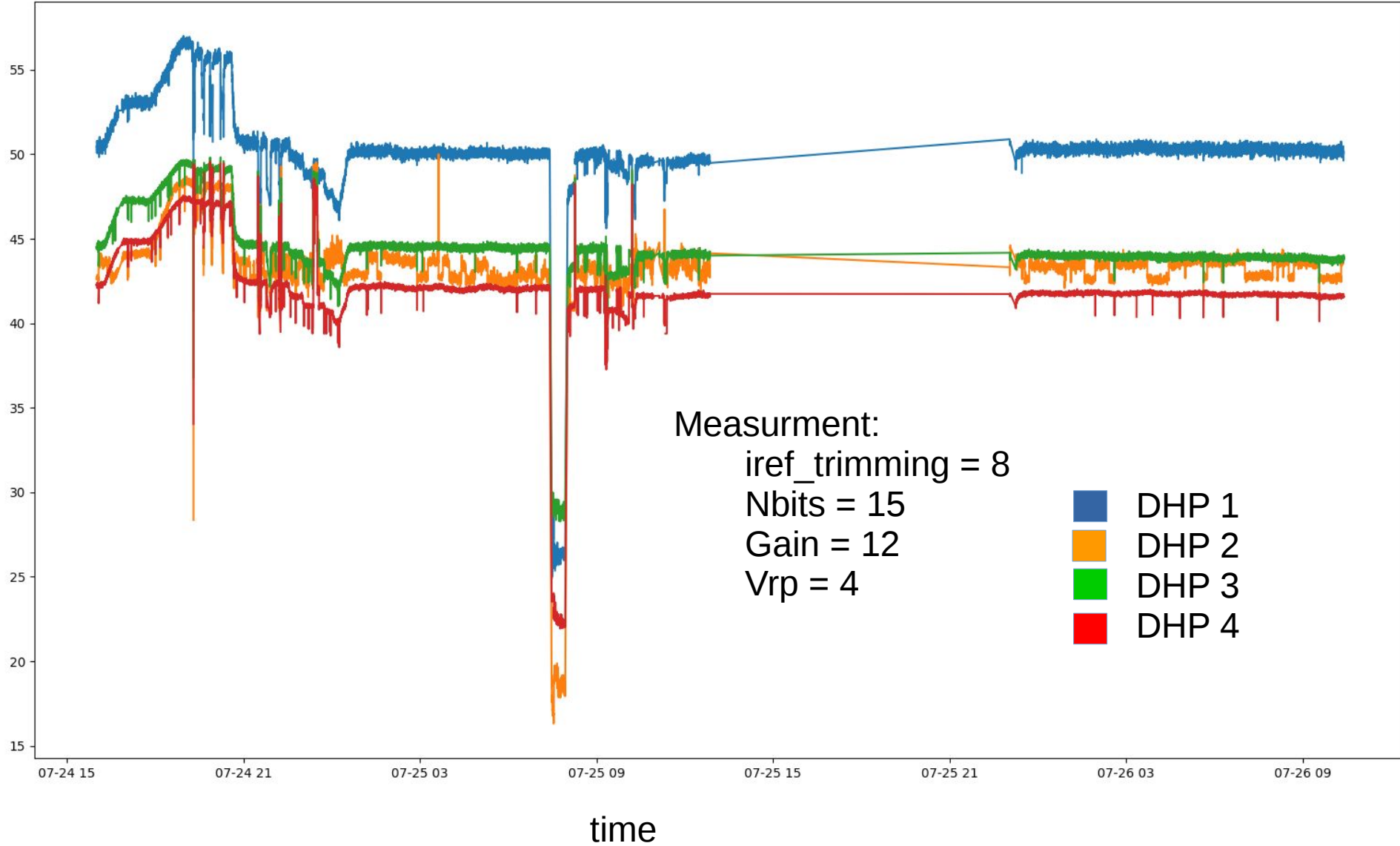
- used standard parameters dly=0, bias=220, biasd=130 throughout
- never had any trouble with the link stability

DCD data delay scan
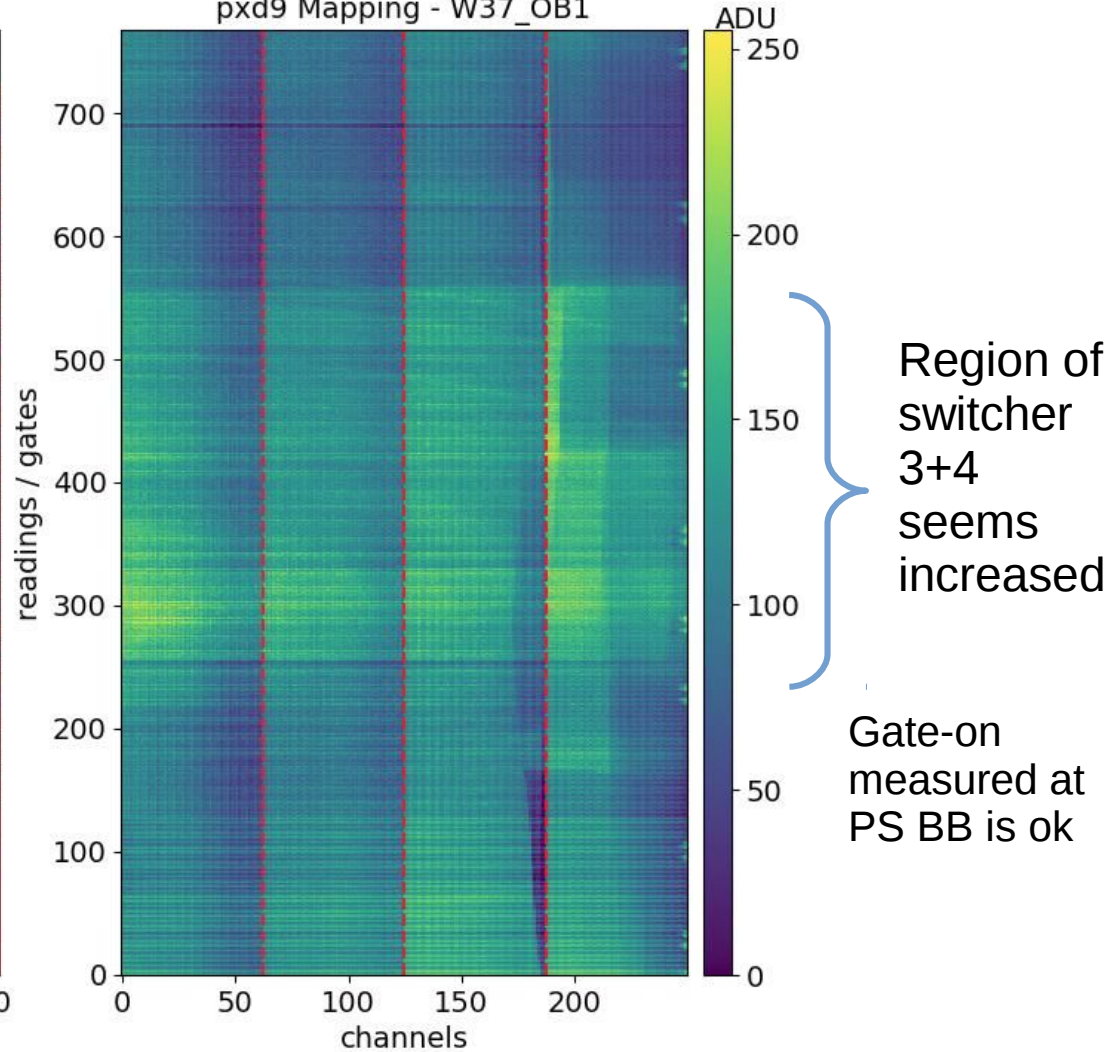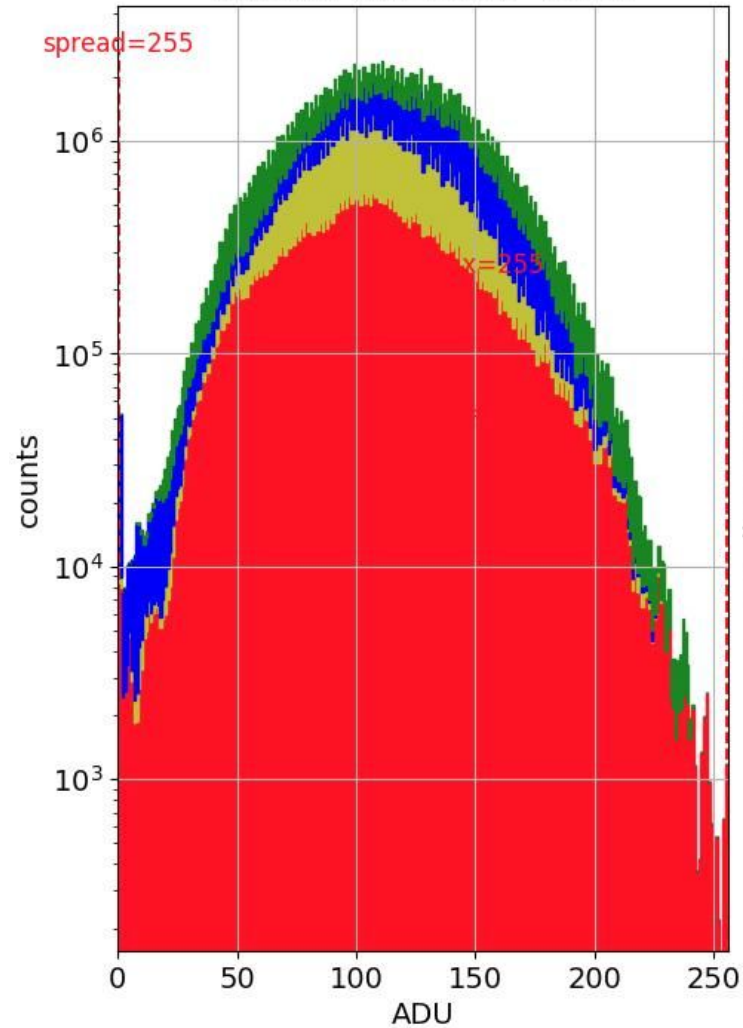
https://elog.belle2.org/elog/PXD-Mass-Testing/245
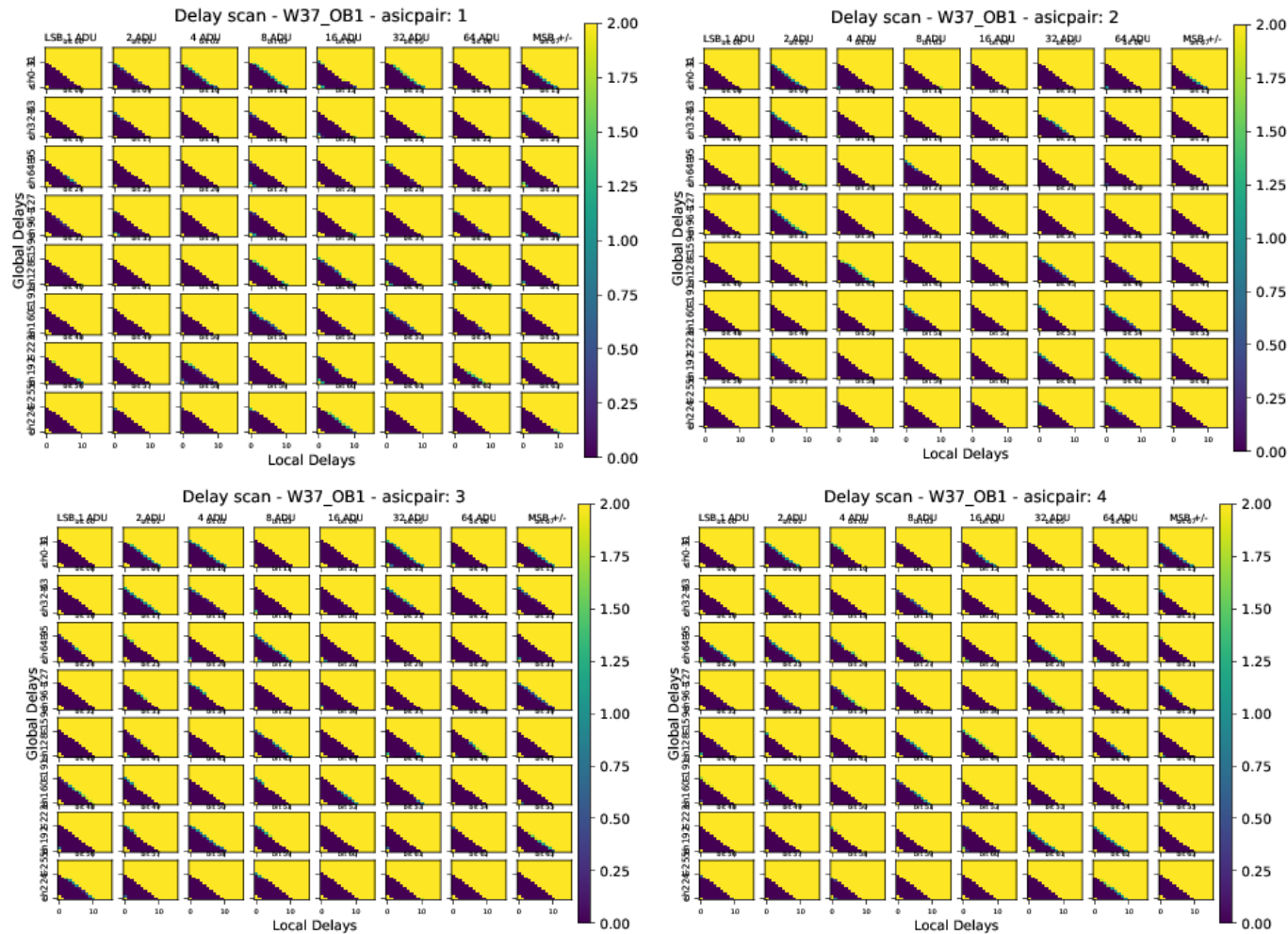
- used all standard parameters
- standard results obtained (global dly = 0, local dlys = 4,5)

Initial pedestals with gate-on = -1V

https://elog.belle2.org/elog/PXD-Mass-Testing/165

Pedestal Distribution - DCD0

pxd9 Mapping - W37_OB1

Region of switcher 3+4 seems increased

Gate-on measured at PS BB is ok

VNsubin = 12, 10, 8, 6

Initial pedestals with gate-on = -1V

https://elog.belle2.org/elog/PXD-Mass-Testing/165
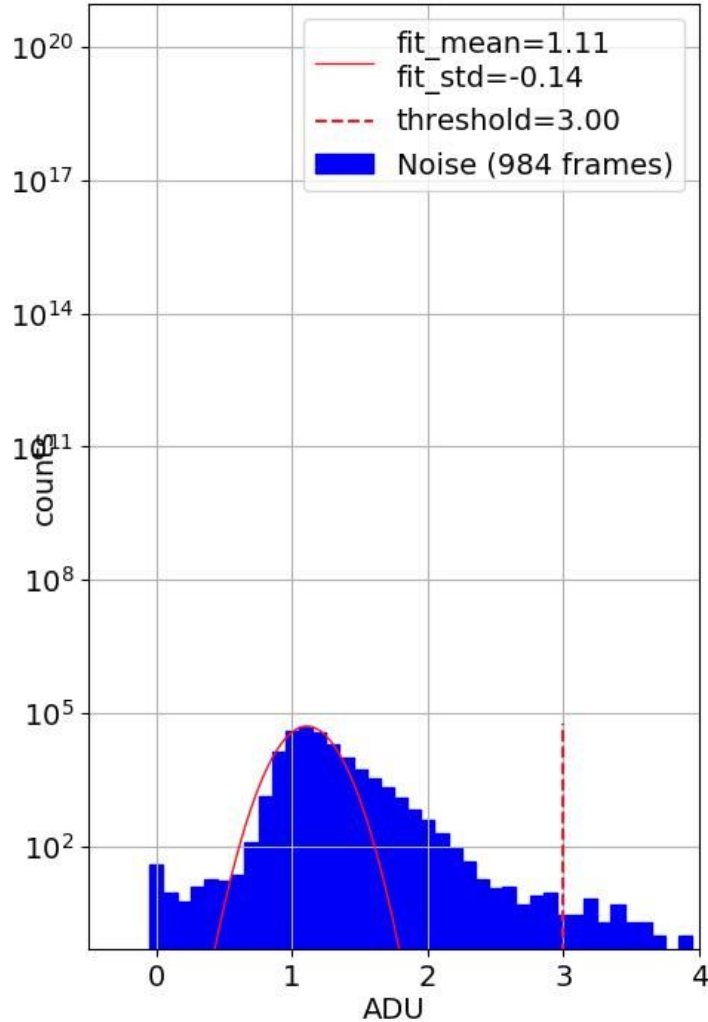
Left side of DCDs slightly noisier than right side, all DCD
parameters standard

Initial pedestals with gate-on2 = -0.9 V

Gate-on1 = -1V
Gate-on2 = -0.9V
Gate-on3 = -1V

Region of switcher 3+4 more like the others

Gate-on measured at PS BB is ok
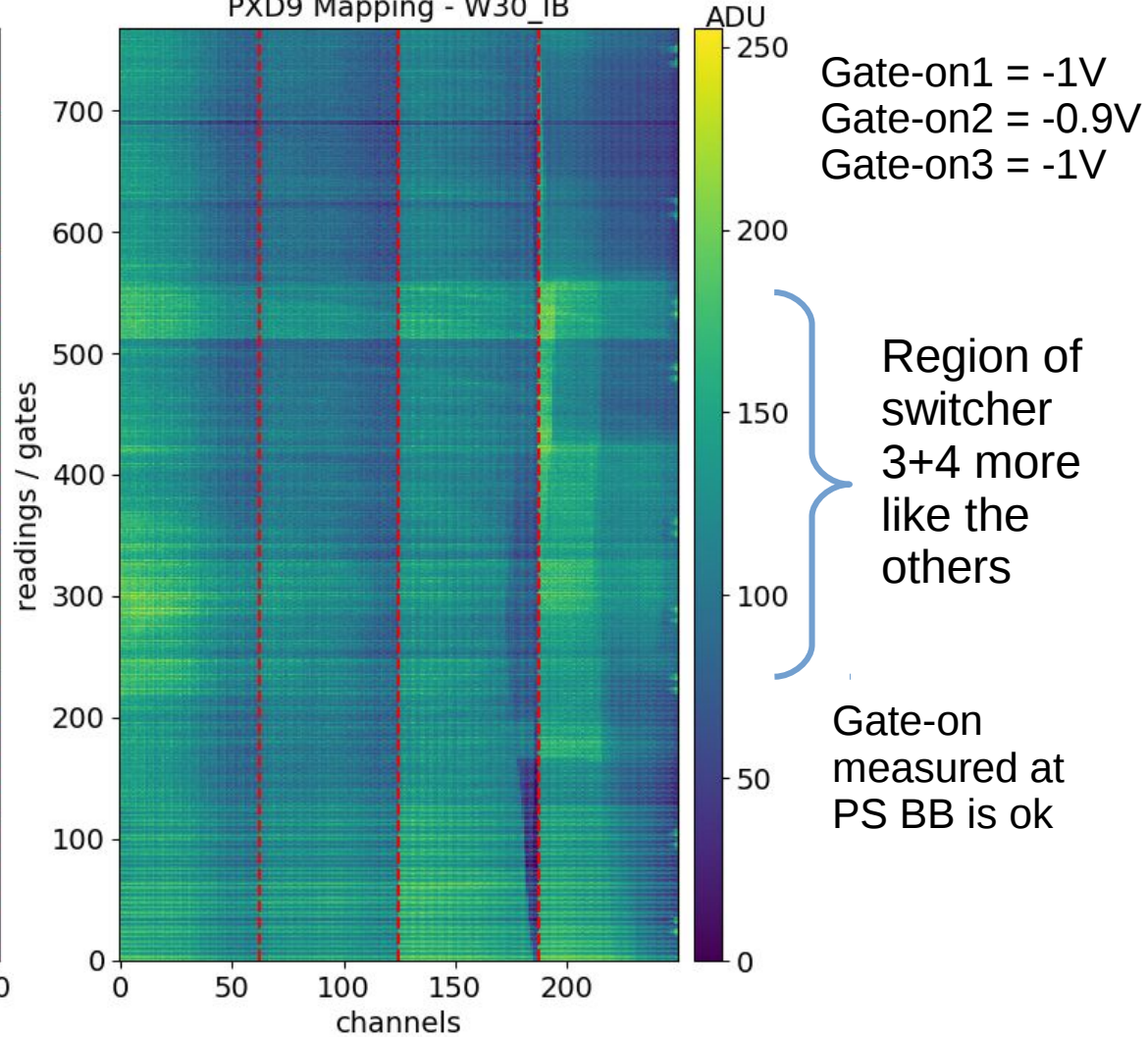
VNsubin = 11, 10, 8, 6

DCD offset delays determined

← Extensive description of procedure!!

Pedestal Distribution - DCD0

spread=253

max=253

min=1

PXD9 Mapping - W30_IB
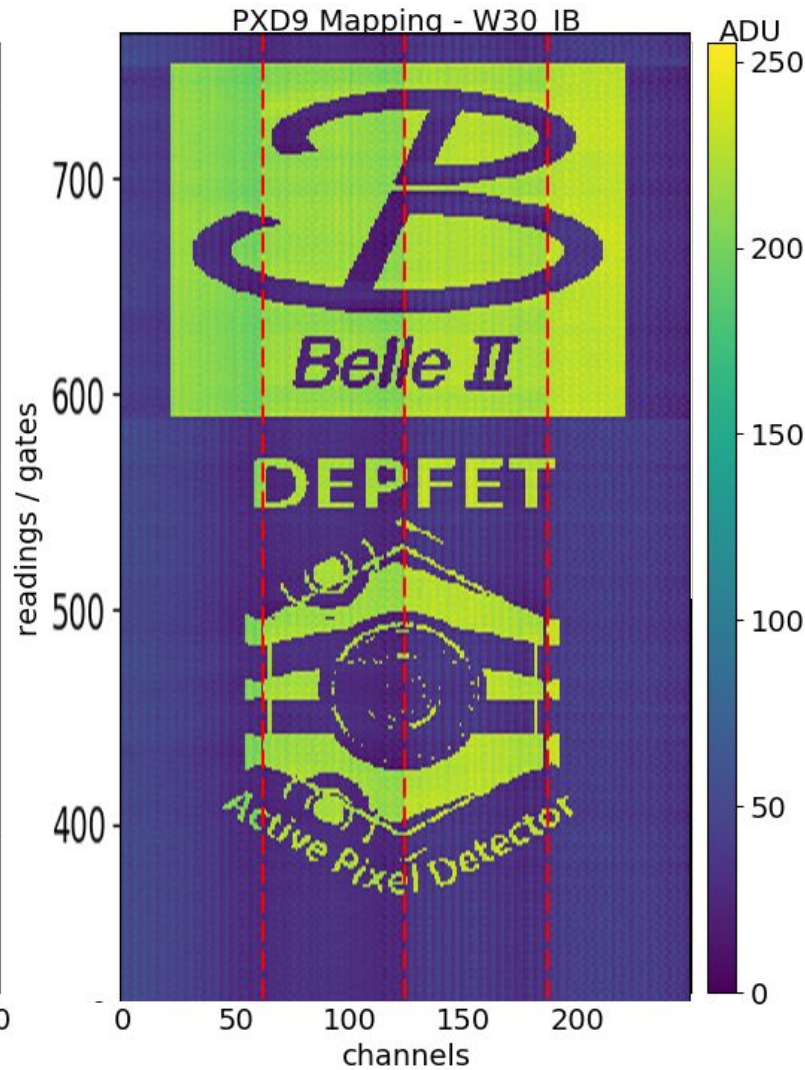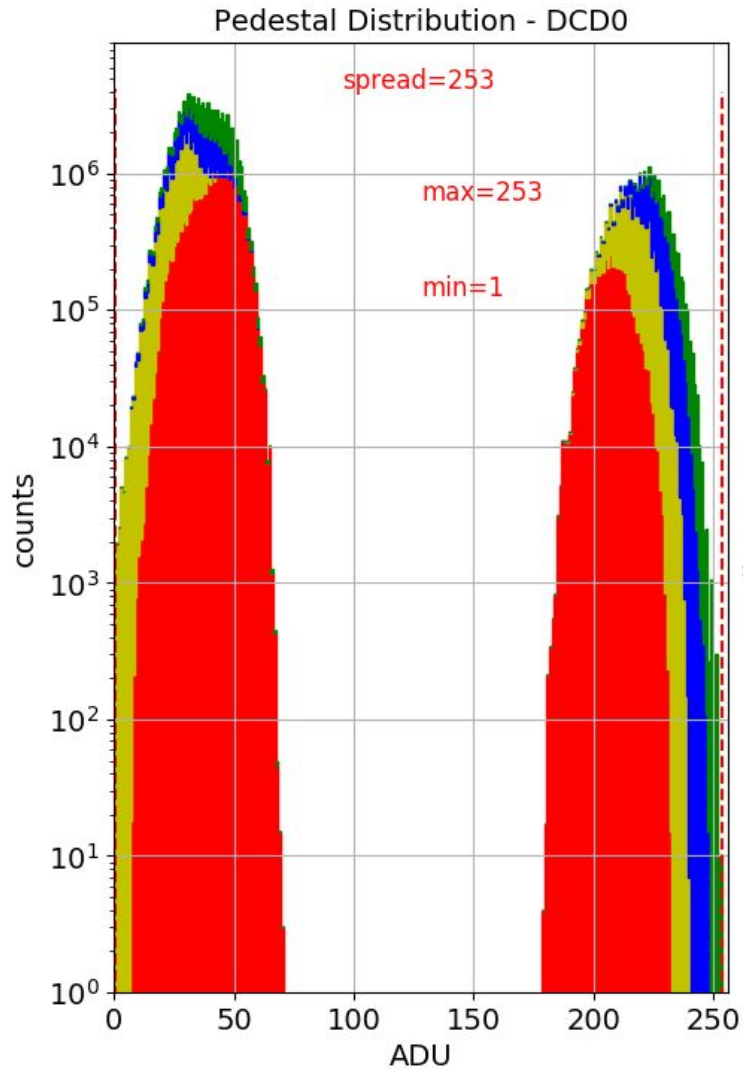
Gate-on1 = -1V
IPdac = 16
Vnsubin = 5

Serin deleted from sequence

offset_fsync_dly 0
offset_des_dly 8
offset_dcd_dlys 0

Pedestal offset correction at – 1V Gate

Extensive description of procedure!!
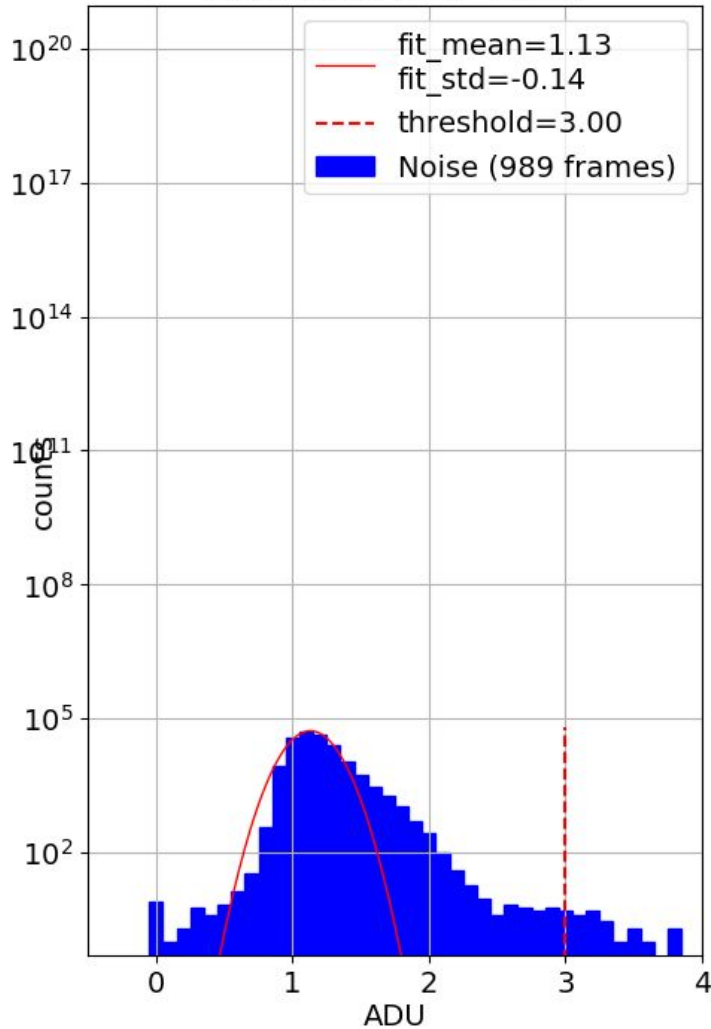
Pedestal Distribution - DCD0

PXD9 Mapping - W30_IB

VNsubin = 17, 13, 12, 10   IPDAC = 15, 10, 12, 13

Pedestal offset correction at – 1V Gate

https://elog.belle2.org/elog/PXD-Mass-Testing/290

Extensive
description of
procedure!!

VNsubin = 17, 13, 12, 10   IPDAC = 15, 10, 12, 13

Pedestal offset correction at – 2.5V Gate

Gate-on1 = -2.5V
Gate-on2 = -2.4V
Gate-on3 = -2.5V
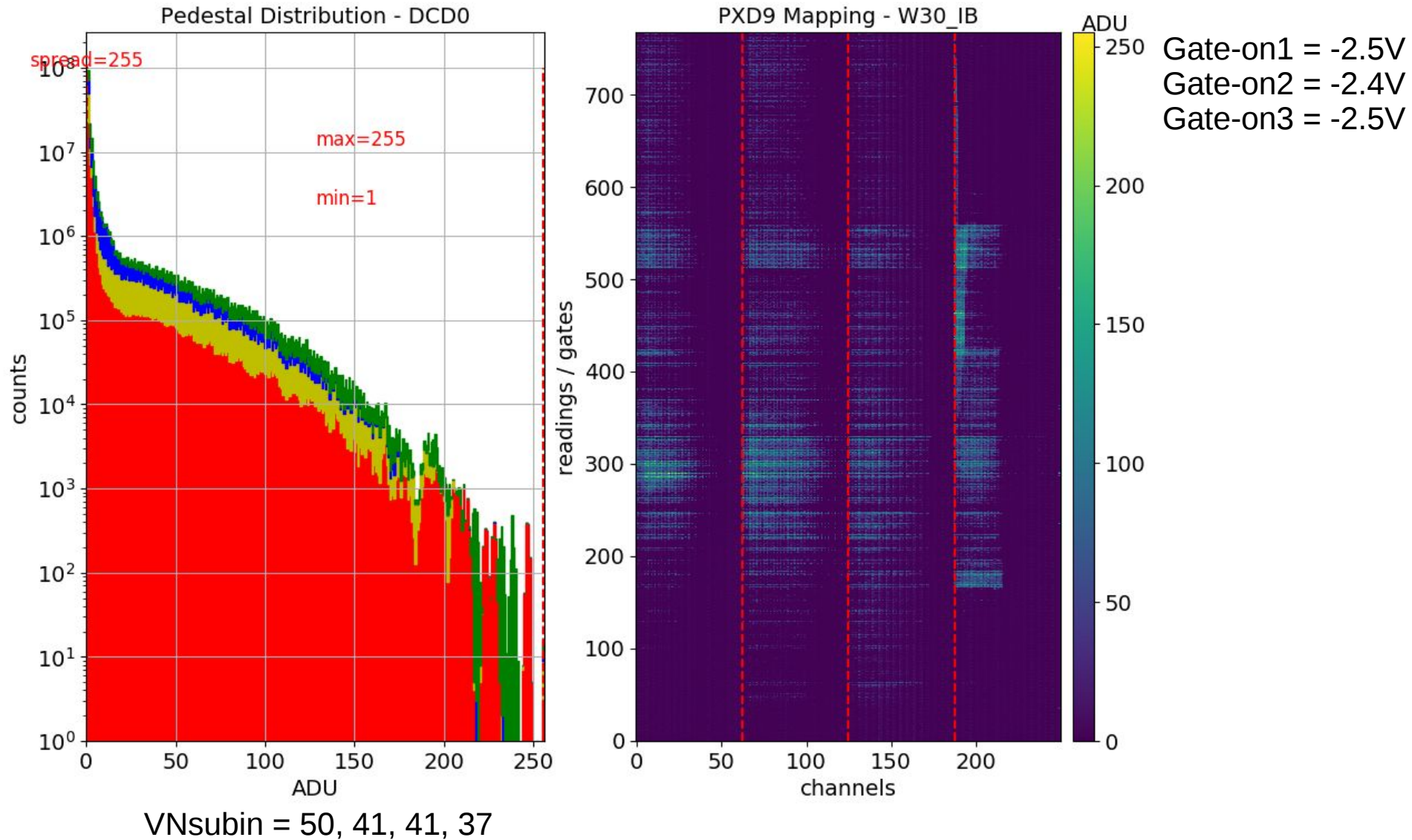
VNsubin = 50, 41, 41, 37

Pedestals at – 2.5V Gate

Noise Distribution - DCD0
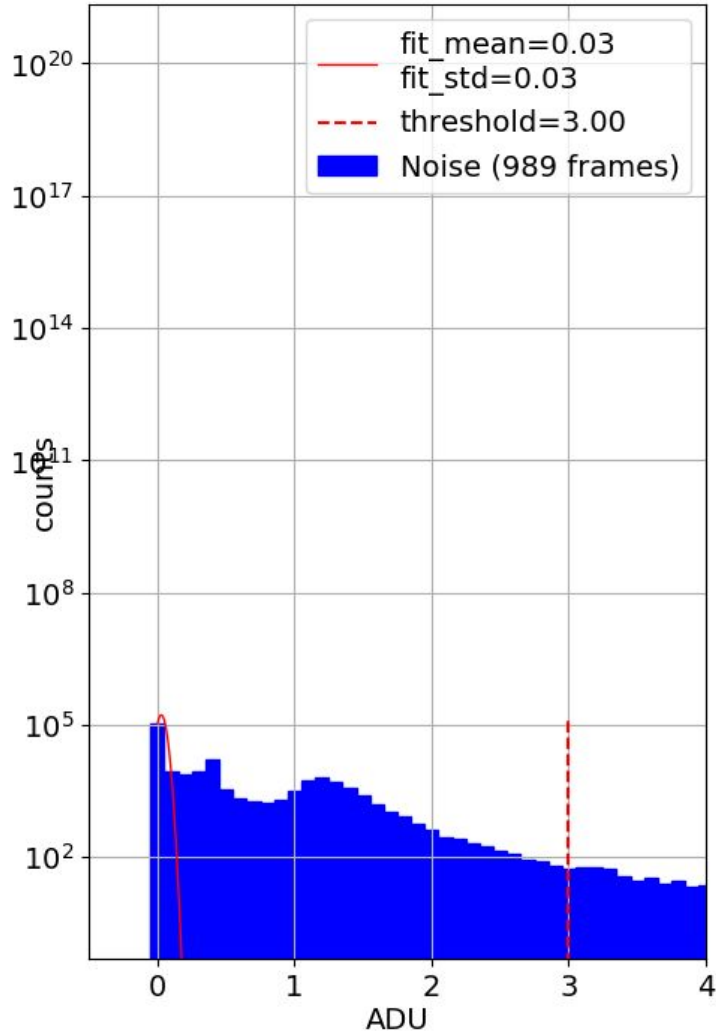
Noise of 989 frames - PXD9 Mapping - W30_IB
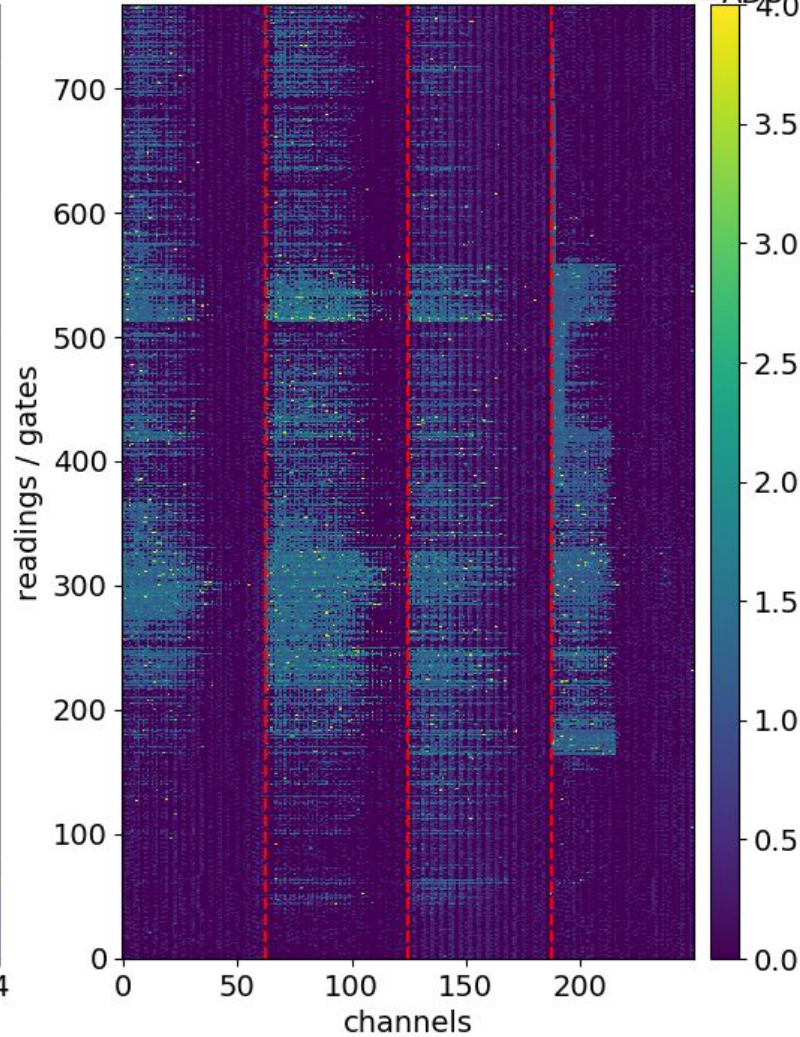
Gate-on1 = -2.5V
Gate-on2 = -2.4V
Gate-on3 = -2.5V

VNsubin = 17, 13, 12, 10

Pedestals with offset corr. at – 2.5V Gate

Pedestal Distribution - DCD0
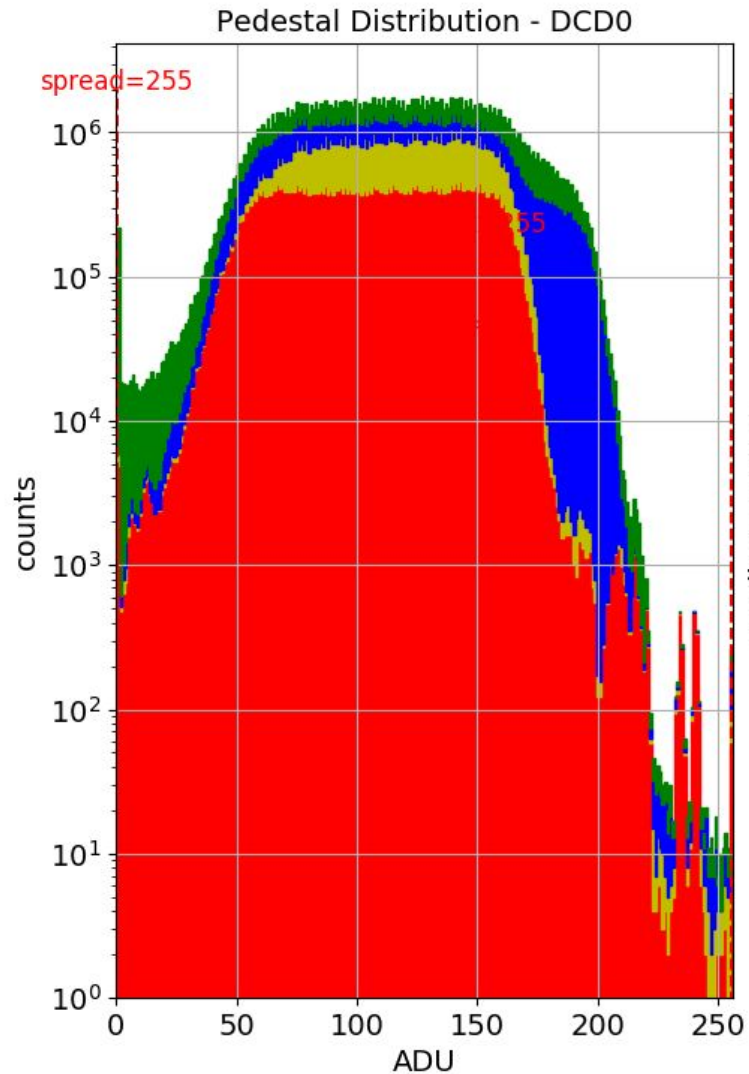
PXD9 Mapping - W30_IB
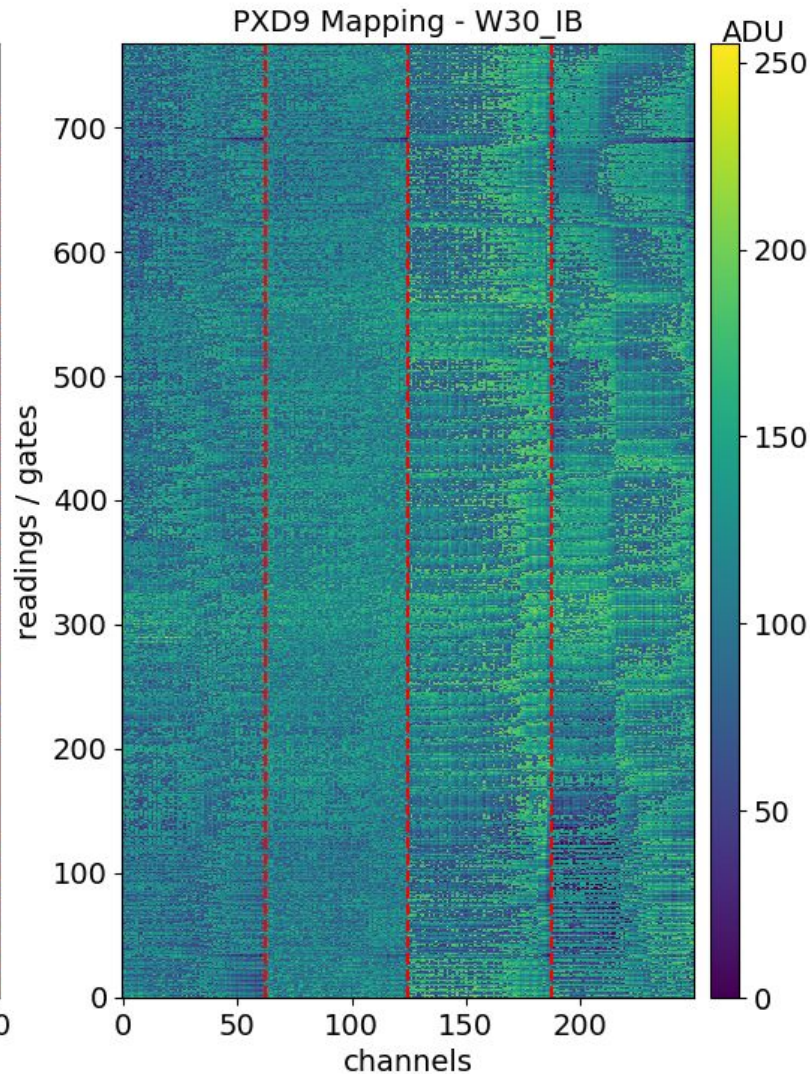
Gate-on1 = -2.5V
Gate-on2 = -2.4V
Gate-on3 = -2.5V

HV = - 70 V
Drift = - 5 V

VNsubin = 50, 41, 40, 37   IPDAC = 30, 22, 35, 34

Pedestals with offset corr. at – 2.5V Gate

Noise Distribution - DCD0
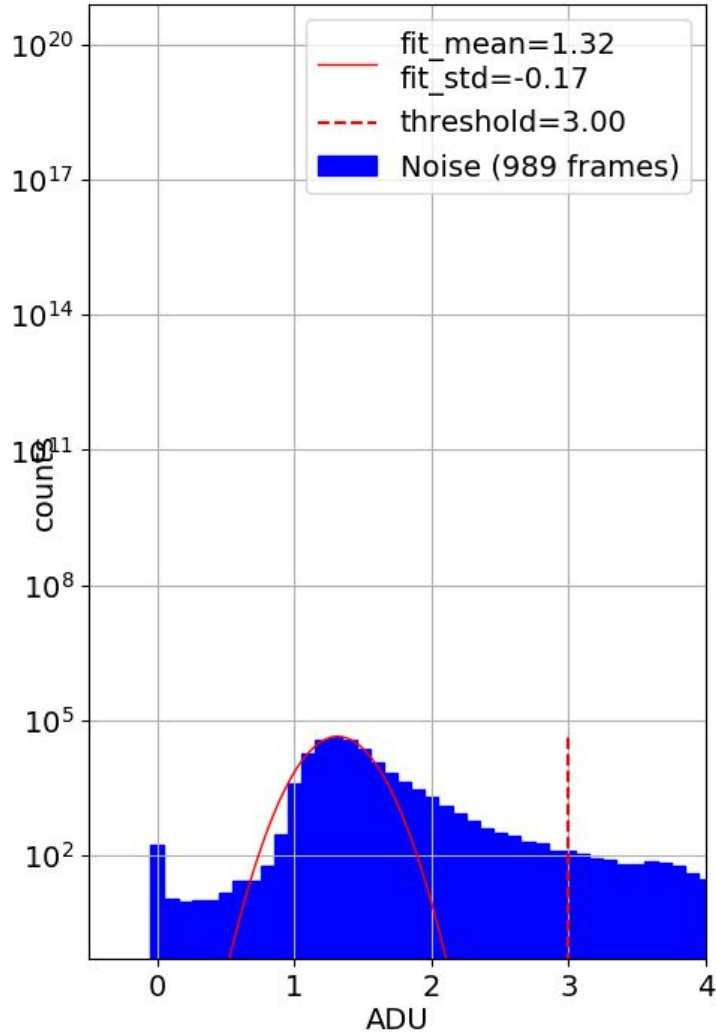
fit_mean=1.32
fit_std=-0.17
threshold=3.00
Noise (989 frames)

Noise of 989 frames - PXD9 Mapping - W30_IB

Gate-on1 = -2.5V
Gate-on2 = -2.4V
Gate-on3 = -2.5V

HV = - 70 V
Drift = - 5 V

VNsubin = 50, 41, 40, 37   IPDAC = 30, 22, 35, 34
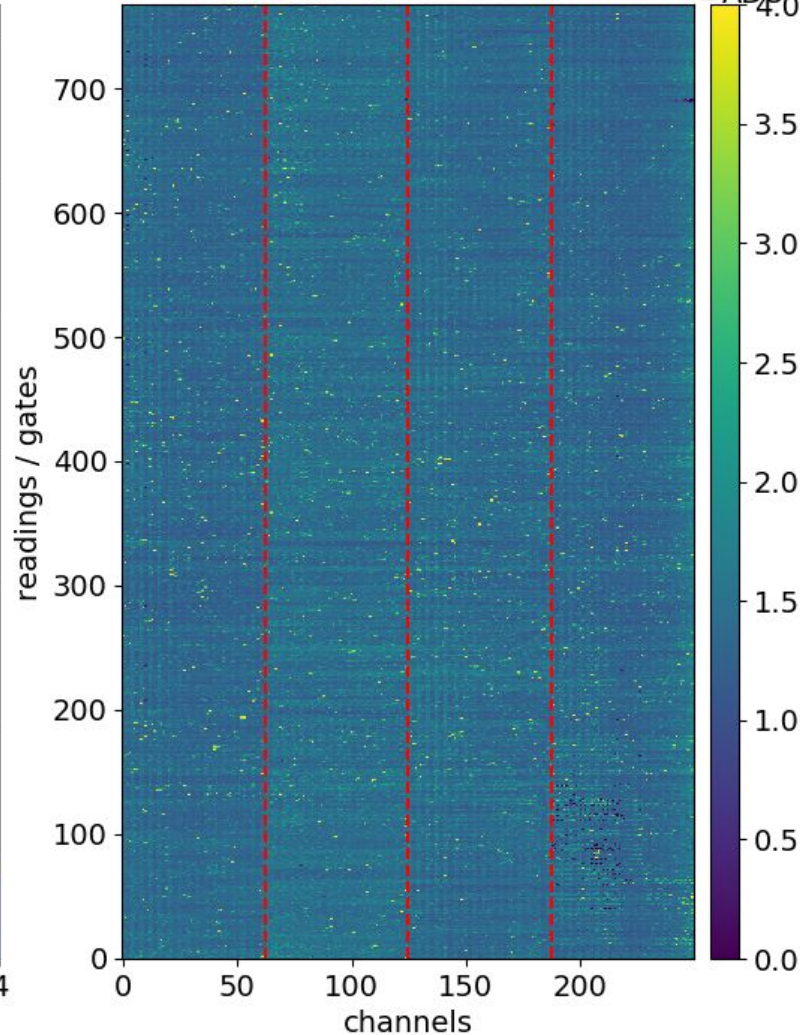
Sr90 source scan still not homogeneous

HV = - 64 V
Drift = - 7 V
Gate-On = - 2.5 V

Larger pixels

Dead region

- Some delicate tuning required
- Maybe Drift -8? How low can we go?

Rings...

Sr90 source
over the
middle

Low
efficiency
gates

15 kHz trigger
for 8 minutes with DHE autotrigger

Threshold 6
pedestal offset 10
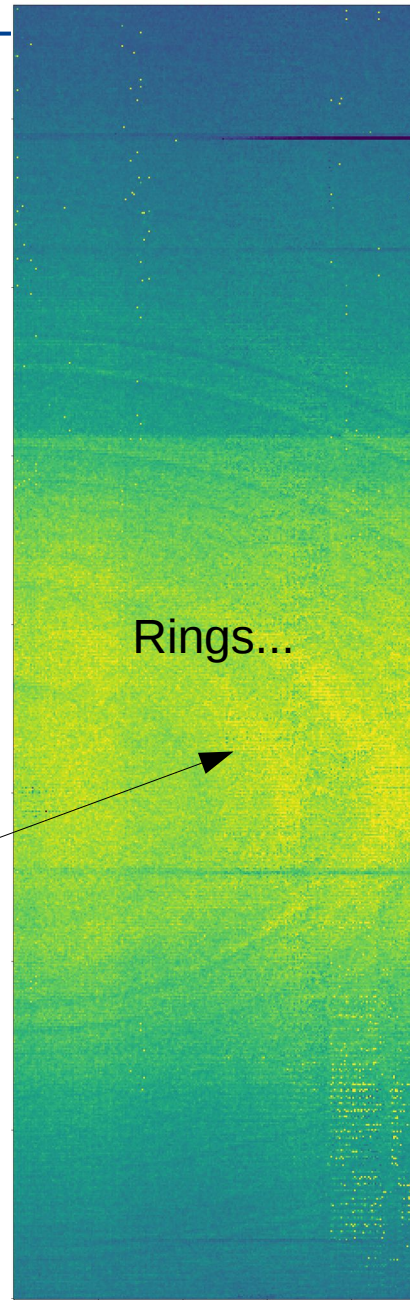
Sr90 hit maps

HV -60 V   -62 V   -64 V   -66 V   -68 V   -70 V

NIVERSITÄT BONN
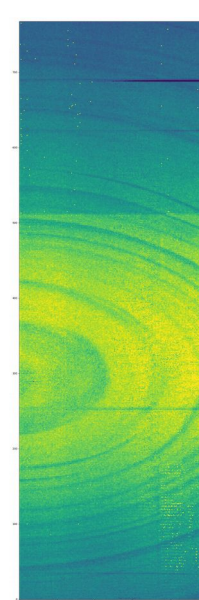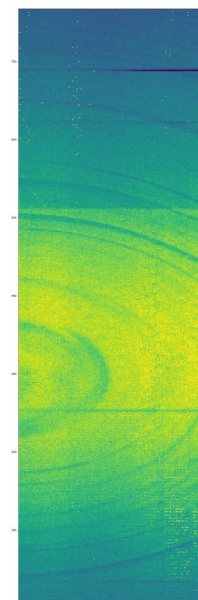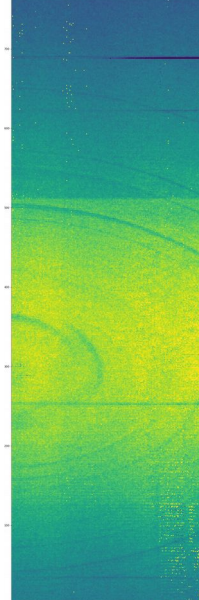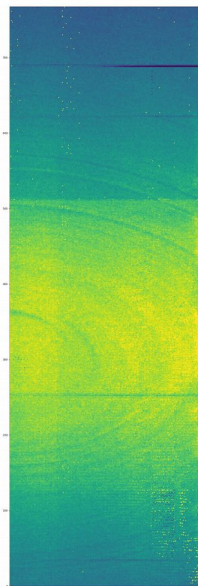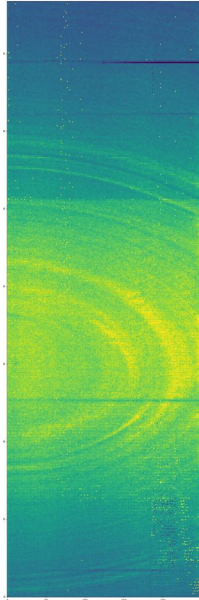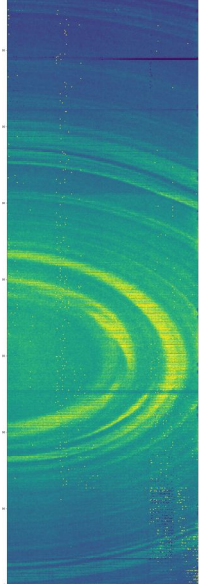
Drift – 5 V
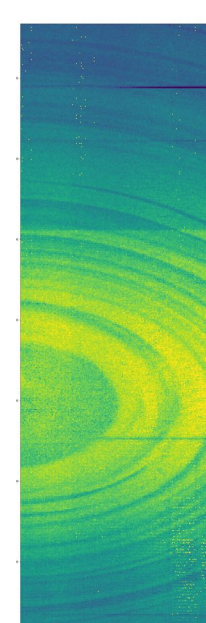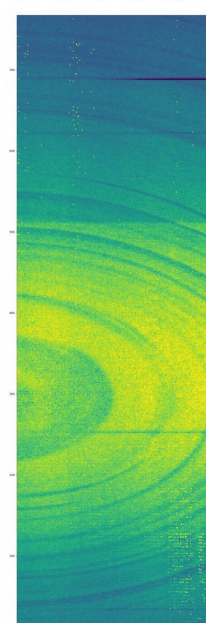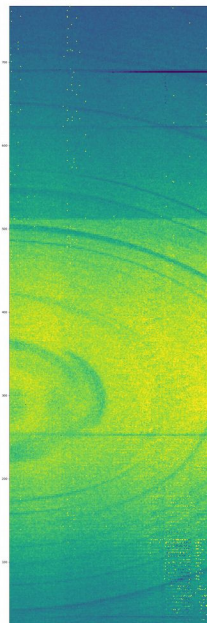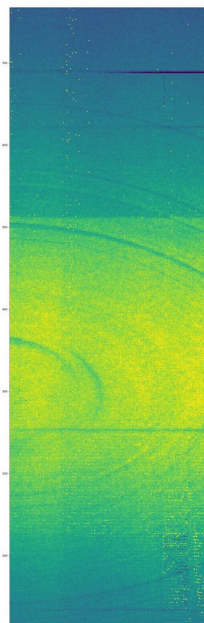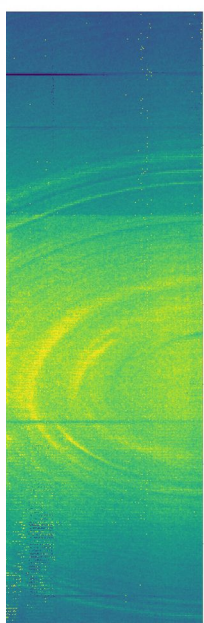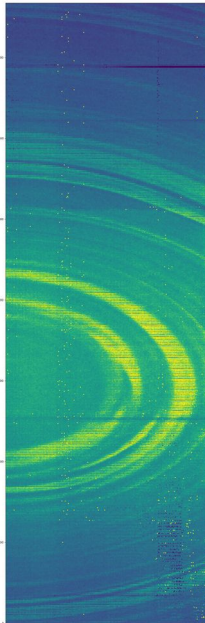
Drift – 4 V

Sr90 hit maps

HV   -60 V   -62 V   -64 V   -66 V   -68 V   =70 V
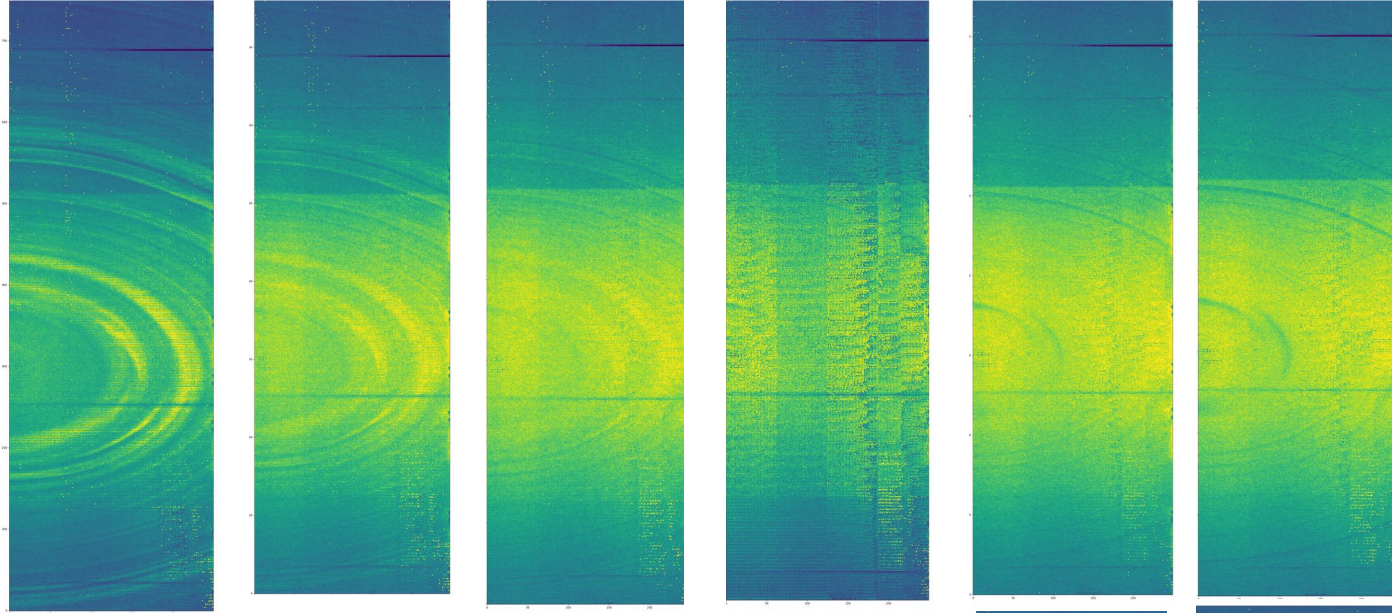
Drift – 7 V
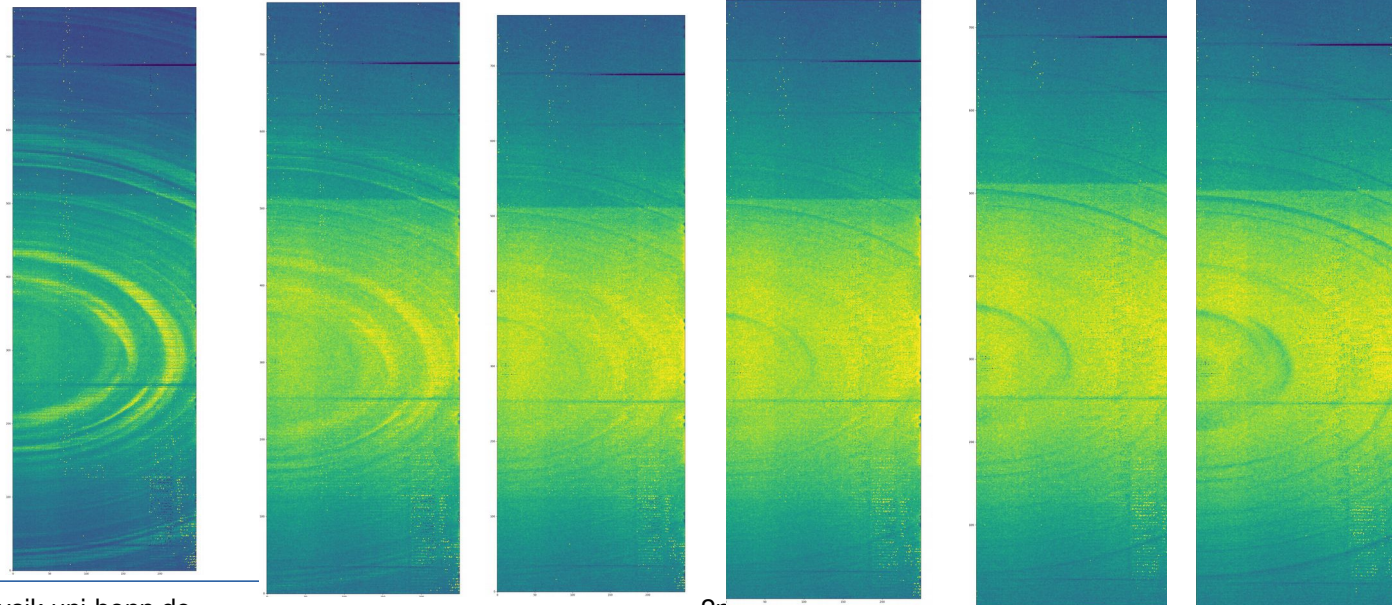
Drift – 6 V

Gain and currents at Gate-on = - 2.5 V

System state archiving and dumps

- ConfigDB entries 505 and 514 used

- Standard scans produce reliable dumps

- EPICS archiver was running continuously storing most system PVs every second or more often

- Vast amount of data available tens of GB of pedestal data, hundreds of GB of source scan data

- Online monitor very useful tool to check scan quality without interfering (attach to running BonnDAQ instance)