Open Issues for PXD1 and PXD2
–
What we learned & what to improve

PXD/DEPFET Meeting
16-18.5.2021

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Intro

- Many small and large issues have not been solved until now for many reasons
- Lack of man power
- Unclear how to solve it
- Priorities
  - Lack of time & will

- Problem:
  - We need to solve them in the near future
  - Man power will not increase, expertise is lost

- Do not consider the list complete

Trip & ASIC SEU

- PSU – SEU/OVP/Trips
  - Hardware: exchange component?
  - Software: Recovery while data taking?

- ASIC SEU handling
  - Detection (DHP, DCD?)
  - Automatic recovery, preventive re-write of registers (DCD)
  - DHP memories? Switcher sequence?

Documentation

- Manuals, technical documentation etc is often outdated
  - Hard to keep up-to-date in confluence
  - Outdated material is often not removed nor marked as outdated
    - While searching, you find the wrong (outdated) page → this already led to some downtime last year!
- Hardware (what is where, what is connected where and how) is not complete or not understandable without checking in person. (preparations for PXD2)

(Hot) Spares, Redundancy, Replacement, Risk Management

- Confluence page (second version)
- Document spares and replacement procedures; evaluate possible risks
  - Hard to convince groups to provide accurate information
  - (inventory will anyway change this summer, thus hard to apply pressure)
  - → we need to have to do this better for PXD2, document inventory from the beginning
- Be more strict: exercise worst cases!

Cold Start Procedures

- Cold start procedures (for non experts) are only partly existing
  - → Sequences, scripts
  - Not everything is scriptable.
- → In case something goes really wrong (SEU crashes PC, crate, etc) we rely on expert knowledge

Shifts & Experts

- Shifts are currently rather “boring” due to automation
- Few in-depth knowledge necessary for normal shifter → rather close to put all work on CR shifter during normal operation. Even DQM run flagging, shift reports can be further automated → pure on-call
- Problem: day shifts, weekend shifts are always hard to fill. It is unlikely that this gonna change even with pure on-call scheme
- Problem: if something now goes wrong, it is not solvable by shifter
  - → on-call expert is needed, experts for different part of system ← we are lacking this already now.

Occupancy Fluctuations

- N_2 flow fluctuation → temperature fluctuation → fluctuations in module occupancies
  - May go away with new modules, but may reappear with irradiation
- Problem is deeper:
  - Any temperature change should be avoided
    - depending on beam current
    - after ramp up
  - New pedestals needed
- Solutions?
  - More N2? Active regulation of flow?

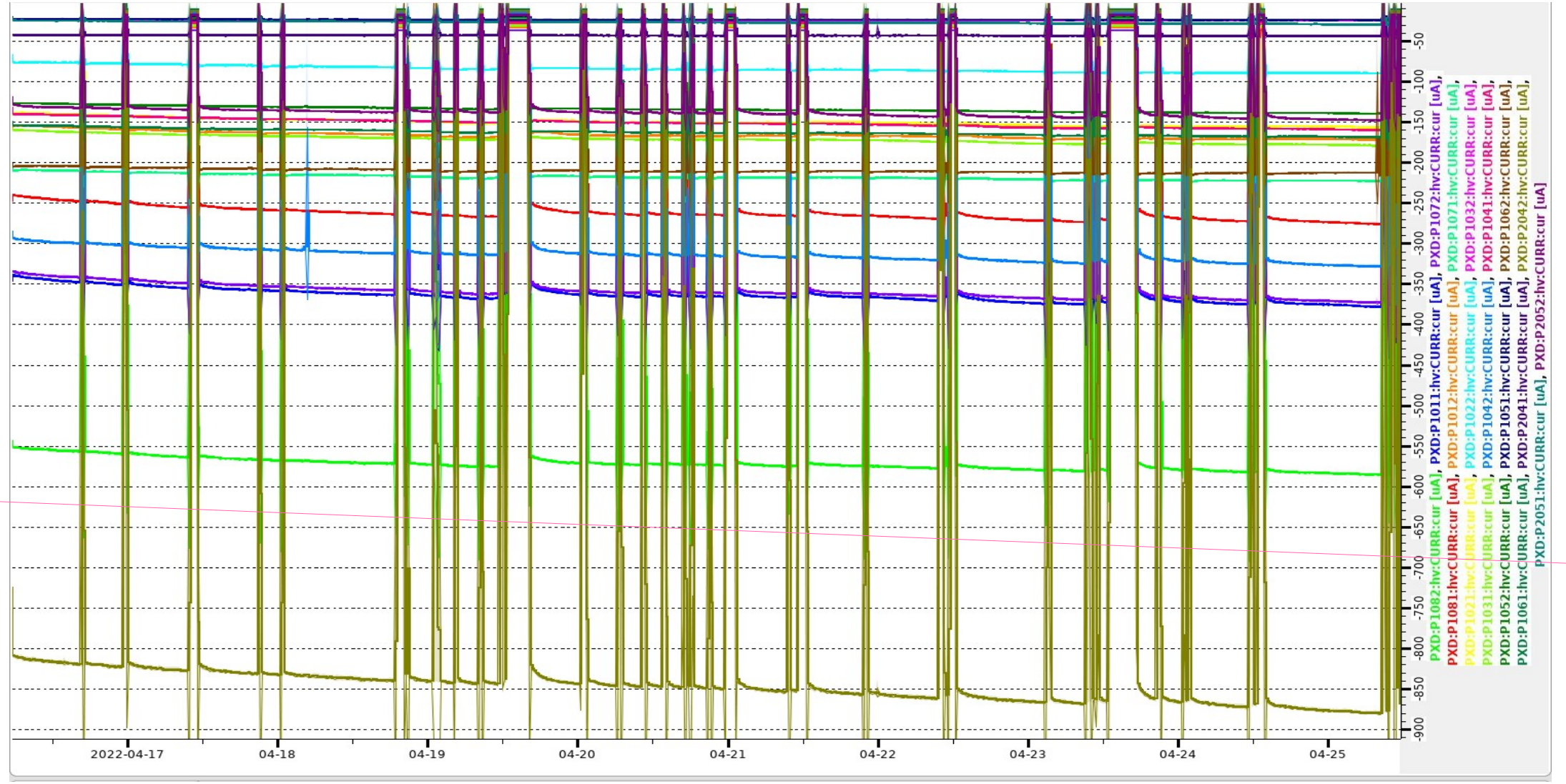
Injection – High Occupancy

- Blinding during injection
  - Gated Mode?
    - → would mask fraction of detector
  - Mask trigger for PXD only
    - Mask full readout
    - depending on other faster detectors
    - Internally by monitoring data rate (“emulate DHP fifo & timeout”)
    - → avoid “missing frame” issue but not CM63 or truncation

- Limits dvd-avdd? Other limits we may reach?
- Stability of calibrations?
- (OVP board)
- (HV currents)

High Voltage Currents

- High Voltage Currents … what is the limit?
  - Do we need to modify the PSU again? (yes, 28mA, but even beyond?)



Fast Emergency Off

- Protect (mainly) switcher channels
- Need more investigations!
  - Nice result in last MAMI test beam, but we need to verify with a real module
    - But how to prove it is safe?
  - Simulation

Modules

- Pedestals spread
  - Offset calibration!
- Pedestals noise
- → for PXD1 (expect we can survive the next two month)
- → for PXD2 (we will run into same issue after some run time)

Proper Optimizing and Mitigation for Noisy Modules

- Broken or Extremely Noisy Structures
  - Strategy for PXD2?
- Rings!
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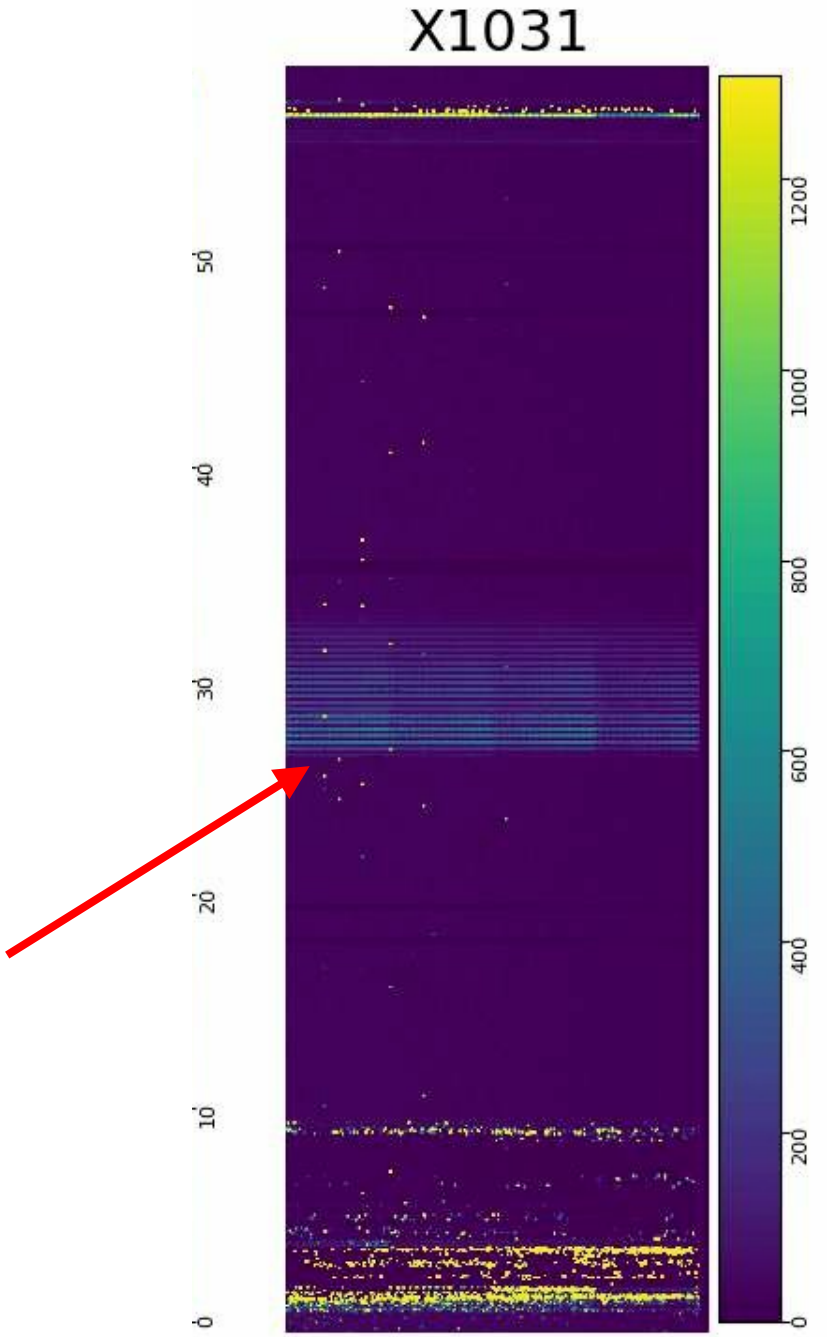

Links & DHH

- Link speed carrier card (new card)
- DHP links (soft errors), proper handling
- Links to ONSEN (still small error rate)
- Error counters (truncation etc) not fully available