Saturday, 23 March 2024

Planning x-ray alignment

- See Lindsay's document for roles and plans.

X-ray alignment at PFBB

- The length from laser plate to optics centre: 62 ft 3 inch = 18.97 m
- 8:37 The cooling is started. (T. Minami)
- 9:02 am setting up quad cell. Required brief unbagging of connector but we're still at 20 ºC.
- Radiation meter
  No. 58: optics side near the SAAS or laptop for cooling in a small room.
  No. 59: x-ray generator side (with Wayne?)
- The height of beam laser: 51.5 ft
- 9:38 laser beam alignment start
- 9:44 adjust the height of the payload
- 10:20 coalignment is confirmed

More detailed SAAS notes available here.

Communication setup

run1

- Validating GSE <=> Exp communication, all subsystems data collection after moving Exp to test config.
- Connected Ethernet to both CMOS, DE, and Timepix for this test. SAAS output is just over BNC to monitor in broom closet.
- 8:28 am confirmed power input connector to Exp and powered on, nominal power consumption.
- 8:30 am power on CMOS 1 and CMOS 2
- 8:32 am power on all CdTe.
  - Ping good
- 8:33 am can ssh to CMOSes and CdTe DE from GSE uplink computer.
- 8:35 am powered on Timepix and SAAS
- 8:36 am confirm SAAS video feed
- 8:36 am start taking CdTe sparse pedestals and CMOS data
- 8:45 am stop taking CdTe and CMOS data
- Started using remote desktop instead of direct GSE uplink control
- 8:46 am powering off Timepix (via remote desk)
- 8:47 am stopping log (via remote desk)

X-ray generator and radiation check

Written by Riko.

- Lindsay, Wayne, Dan, and Riko were in the X-ray generator room.
- 10:52 am Wayne turned on the X-ray generator with half power.
- 10:54 am Full power (30 kV 1 mA)
    - Lindsay and Dan confirmed that the room radiation was okay except for the door crack.
- 11:05 am Lindsay walked around outside the building to confirm the radiation was okay.
- 11:07 am Wayne turned off the X-ray generator.
- 11:09 am Wayne turned on the X-ray generator with full power.
    - Lindsay walked around the building to check the radiation.
- 11:11 am Wayne turned off the X-ray generator.
- Lindsay was standing at the northeast corner and Dan was at the southeast corner.
    - 11:19 am Wayne turned on the X-ray generator with full power.
    - The northeast corner was okay. The southeast was okay if you are sitting.
    - The northwest corner was okay. The southwest was okay.
- 11:24 am Wayne turned off the X-ray generator.
- 11:27 am Wayne turned on the X-ray generator with full power.
    - Lindsay checked the radiation.
- 11:29 am Wayne turned off the X-ray generator.

Prep for x-rays

run2

- Taking full mode pedestal
- 12:15 pm power cycled all CdTes
- 12:19 pm biased to 200 V (after 100 V first)
- 12:20 pm starting taking data
- 12:06 pm stopped taking data, saved, extracted raw from DE

run3

- Taking sparse mode pedestal
- 12:32 pm deleted DE files, set sparse mode.
- 12:33 pm started taking data
- 12:37 pm stopped taking data

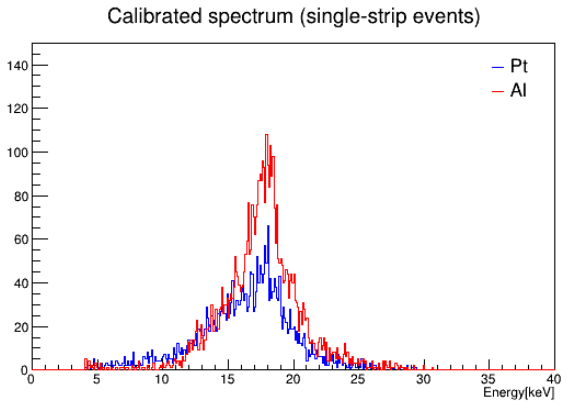
run4

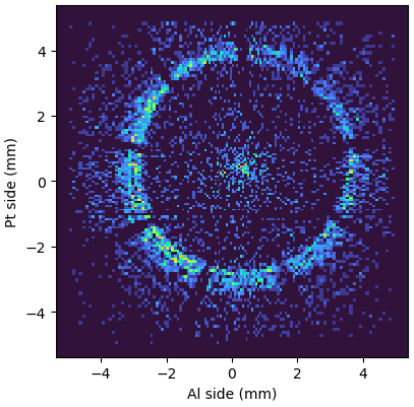
- Was planning to start x-rays, but not ready this run.
- LN2 as low as Kris could get
- -19.8 ºC, 200 V bias
- 12:41 pm or so started new GSE file

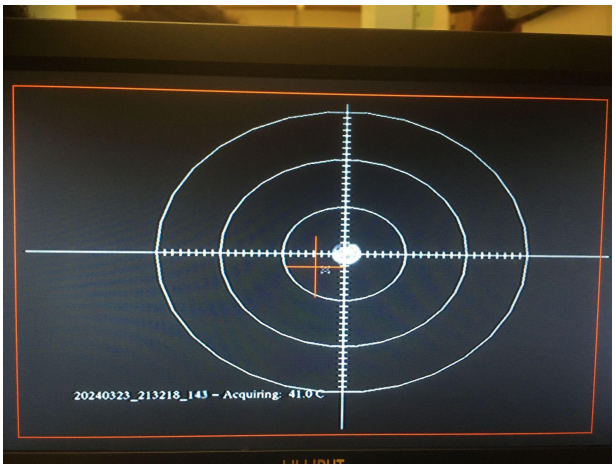
- 12:43 pm started taking CdTe data
- 12:50 pm powered on SAAS
    - Need to align SAAS with laser. No x-rays. Pausing to align.
- 12:55 pm stopped CdTe data taking
- 12:55 pm started Timepix, deleted all CMOS onboard data. Plan going forward will be to observe with all detectors for all runs, for flight-like-ness.
- 12:58 pm see Timepix data coming in
- 1:27 pm SAAS aligned

run5

- 1:30 pm started GSE and CdTe readout, deleted data first
- LN2 on, -19.6 ºC, 200 V bias, x-rays in pos 2.
- 1:31 pm starting x-ray generator
    - 30 kV, 1mA
- 1:36 pm stopped CdTe data taking and stopped GSE, saved out DE files.
- cdte4 plots (from GSE files, after calibration):



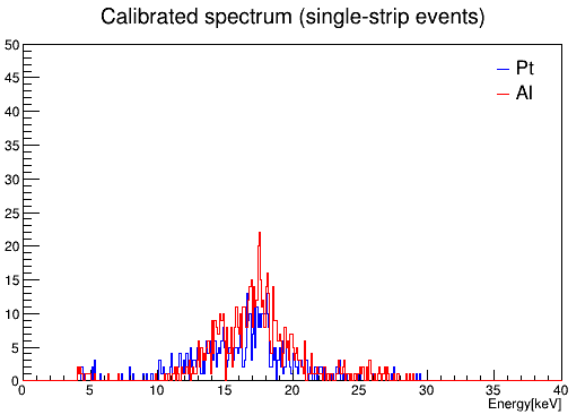


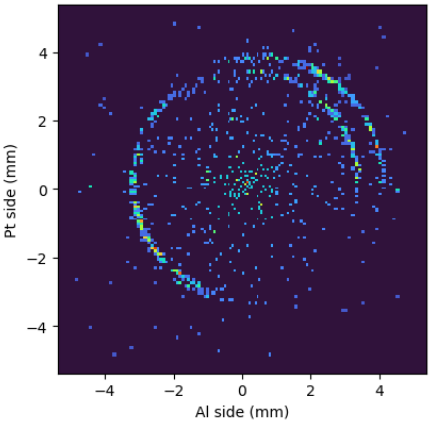


run6

- 1:42 pm aligning for pos 3
- 2:00 pm deleted CdTe data.
- 2:01 pm started CdTe and CMOS observation.
- LN2 low, -20.3 ºC
- 2:03 pm starting x-rays

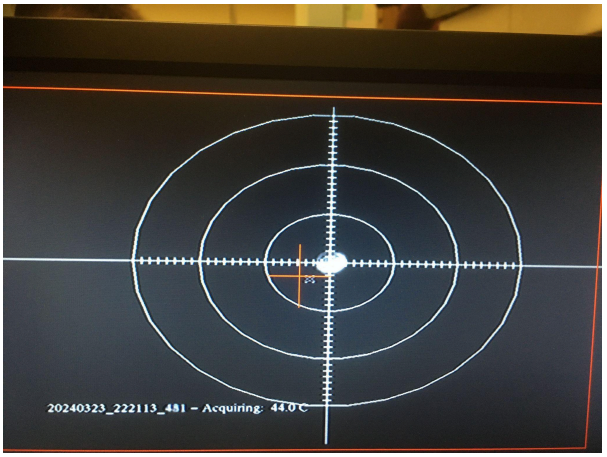
    - 30 kV, 0.1 mA
- 2:05 pm not seeing ring on GSE.
- 2:07 pm see rings, but image is odd.
- 2:08 pm stopping x-rays.





run7

- 2:17 pm going to take more data in the run6 configuration
- 2:18 pm stopped CdTes, deleted data, stopped CMOS
- 2:19 pm starting CdTe observation
- 2:19 pm starting x-rays
    - 30 kV, 1 mA, full power
- See ring faster this time
- 2:24 pm stopping data collection, ramping down x-rays



run8

- 2:28 pm moving to pos 4 – no realignment necessary
- Deleted CdTe onboard data
- 2:31 pm starting CdTe data taking
- Focal plane at -19.7 ºC
- 2:31 pm starting x-rays
    - 30 kV, 1 mA
- 2:33 pm not seeing ring on GSE, but see ghost rays in pos 3 and pos 2
- Note on GSE: livetimes still jumpy.
- 2:40 pm stopped taking data, SOC GSE saw something different from PAB GSE.
- This was after PAB GSE had Clear Images'd the GSE
- Going to try again.
- Screenshot from broom closet for this run indicates, oddly, a ring on CdTe4?

run9

- 2:44 pm restarted SOC and PAB GSEs.
- Confirmed we should be sending _stop and _readout_stop to stop CdTe observation (not de_end). This is how we have been operating.
- At -19.7 ºC, bias 200V
- 2:45 pm started taking data with CdTe.
- 2:46 pm starting x-rays
    - 30 kV, 1 mA
- 2:52 pm stopped x-rays
- 2:53 pm stopped CdTe observation and GSE, copied out DE data
- 2:56 pm set CdTe bias 100 V
- 2:57 pm set CdTe bias 60 V
- 2:58 pm powered off CdTe subsystem via uplink command
- 2:59 pm powered CdTe DE back on
- 3:01 pm powered CdTe canisters back on, they ping well.
- 3:05 pm stepped through init, standby, obs, bias 100 V
- 3:07 pm bias 200 V

run10

- 3:14 pm started GSE and CdTe observation
- 3:15 pm ramping up x-rays
    - 30 kV, 1 mA
- 3:25 pm stopping x-rays
- 3:25 pm stopped CdTe observation
- 3:26 pm ish stopped GSE
- 3:28 pm saved out data from DE
- 3:30 pm deleting raw data from DE
- 3:31 pm lowering CdTe bias, then powered off CdTe system
- 3:36 pm powered CdTe system back on

Observations/interpretations:

- In some of the previous runs, it seems like “zombie data” persists from earlier runs. This does not seem to be an issue confined to the GSE, indicating that it’s somewhere farther back in the data stream.
- In run 10, which was after a full power cycle of CdTe detectors and DE, we could see the expected ring on the detector (though a bit faint). In runs 8 and 9 (before that detector power cycle) there was no sign of the ring at all. (Look at DE data to confirm this.)
- Zombie data investigation: suggest to compare telemetry packets and DE data for the same runs (as well as they can be matched up). Update (4 pm): Yixian determined that the zombie images do ***not*** show up in the DE data.

3:30 pm: Kris opened the valve slightly on cooler because pressure had dropped slightly. Temperature was at -19 deg C. Update: upon closer inspection, the cooler computer macro had stopped. The temperature was actually a bit lower than that. Kris restarted the macro. No problem.

run11

- 4:01 pm aligned in pos 5
- Focal plane at -20 ºC
- 4:02 pm started taking data
- 4:02 pm started ramping x-rays
- 4:03 pm full power x-rays
    - 30 kV, 1 mA
- 4:07 pm not seeing anything. Reinitializing CdTe system.
- 4:11 pm bias back up to 200 V
- 4:11 pm starting obs again
- At 4:14 pm, PAB and SOC saw a ring appear at the same time.
    - This indicates its not a delay just for SOC or PAB.
- 4:17 stopped taking data, turned x-rays off.

run12

- 4:31 pm aligned for x-ray generator in pos 0, CMOS 1
- Generator in position 0

- 5:05 pm started taking data with CMOSes and CdTes
- Focal plane at -20 ºC
- 5:08 pm turning on x-rays
    - 30 kV, 1 mA
- 5:09 pm full power x-rays
- 5:19 pm stopped x-rays, stopped CMOSes and CdTes
- Pulled data out of DE.

run13

- 5:31 pm aligning for x-ray generator in pos 1, CMOS 2
- 5:34 pm aligned
- Focal plane -20 ºC
- 5:37 pm deleted CdTe DE data
- 5:37 pm starting CdTe observations
- 5:38 pm starting CMOS observations (stop to start)
- X-ray generator 1 mA, 30 kV
- 5:53 We have a zombie image on CdTe1; we are restarting the GSE to see if that fixes it.
    - It fixes it, no longer see ring in CdTe1 on PAB GSE.
- 6:10 pm stopping CMOS data collection and CdTe data collection. Also X-rays off.
- Done with this position, switching to position 6, Mini-X2, Timepix.
- 6:18 pm started Wireshark recording on PAB GSE

6:34 pm

- Installed Mini-X2 in position 6
- Used same setup as at WSMR: generator taped to source holding fixture, fixture unscrewed in top right corner to allow fixture to tilt forward, screw in left lower corner unscrewed slightly in order to allow the tilt.
- Gave it 7 turns this on the upper right screw this time (actually about 7.25 turns). This may make it more or less aligned than what we saw last time, but Lindsay wanted to make absolutely sure we weren't cutting off the flux. (Don't have a way to see it live with Timepix.)
- Meanwhile, they're working on the alignment. 6:37 pm we are aligned.
- Temperature of focal plane is -2 deg C at 6:37 pm.

run14

- 6:41 pm aligned for x-ray generator in pos 6. Timepix is working, has bias up already.
- 6:44 pm restarted GSE, Timepix data not displaying but being logged. Milo confirms filesizes look good.
- 6:45 pm deleted Timepix data, starting x-rays
    - With Mini X2
    - 30 kV, 125 µA
- 6:46 pm deleted Timepix data again
- 6:47 pm started taking CdTe data
    - Sparse mode, 60 V bias, temp 3.7 ºC
    - Immediately unixtime is jumping around

    - Even the cdte1 pedestal looks like a mix of a full and sparse pedestal (very thin superimposed on noise)
- 6:52 pm stopped CdTe, ramping down x-rays
- 7:10 pm Milo got the CdTe data out
- 7:10 pm powered off all systems
- 7:17 pm stopped GSE pcap

[Analysis of zombie images here]

SAAS Alignment

For the filters, Dan switched them out to 0.3 and 0.6 ND filters. We put the flight/helio filters back in their boxes and I put the box in the gray saas box along with the ring tool. We used the pinhole for the SAAS laser.

For the SAAS, we took images each time which are documented in the notes here.

After alignment: return the OG SAAS filters that are currently in the box

Monday, 25 March 2024

Plans

- Remove CMOS data
- Remove SAAS data (post turn-on test, in afternoon)
- Work on zombie data
- Turn on test with uplink downlink from SOC
- Find (from NSROC) a Dsub splitter for redundant command uplink
- Todo tonight:
    - ☐ Buy a long (10 ft or more) HDMI, if ∃
    - ☐ Buy a small SSD, just to get data up the hill/off the range faster.

Morning

- 8:59 am Shimizu san took data out of both CMOSes.
- 9:01 am shutting down both CMOSes, powering off Exp for move to turn on test.

Power check with NSROC

- 11:03 am Exp rolled out into main PAB to mate connectors with TM.
    - Thanasi plugged in laptop to check formatter turns on. Cannot yet send uplink or receive telemetry at SOC, just verify power.