

# IoLS Updates

David Rivera

October 22nd, 2024



# Laser Run Plan for Week of Oct. 21<sup>st</sup>

- **Monday:** run for ~30 min w/ P1 and at least 30 min w/ P2 while varying the intensity of the lasers
- **Tuesday:** scans w/ P1 to get tracks going upstream. This will also take ~1 hr and will require the same method of scanning and pausing until we get the Slow Controls interface working for an automatic scan
- **Wednesday:** scans with P2 to try to get through-going tracks. This should take ~1hr, given that I'll have to try various directions until we see a nice track. We'll have to aim, pause to change the direction and to check the evds for tracks, and then iterate a few times until we have an orientation that works
- **Thursday:** scans w/ P1 to try to hit the LBLS mirrors, ~1.5hr There are 4 modules; we will attempt to hit as many as we can.
- **Friday:** attempt to get crossing-tracks between P1 and P2. This will involve aiming P1 and P2 such that the resulting tracks intersect each other. The two periscopes don't have to run simultaneously. The plan would be to find fix the orientation of P1 and take a run and then also fix the orientation for P2 and take a run. For this, I think it would be good to have 1.5 hours, if possible, just in case it proves to be difficult

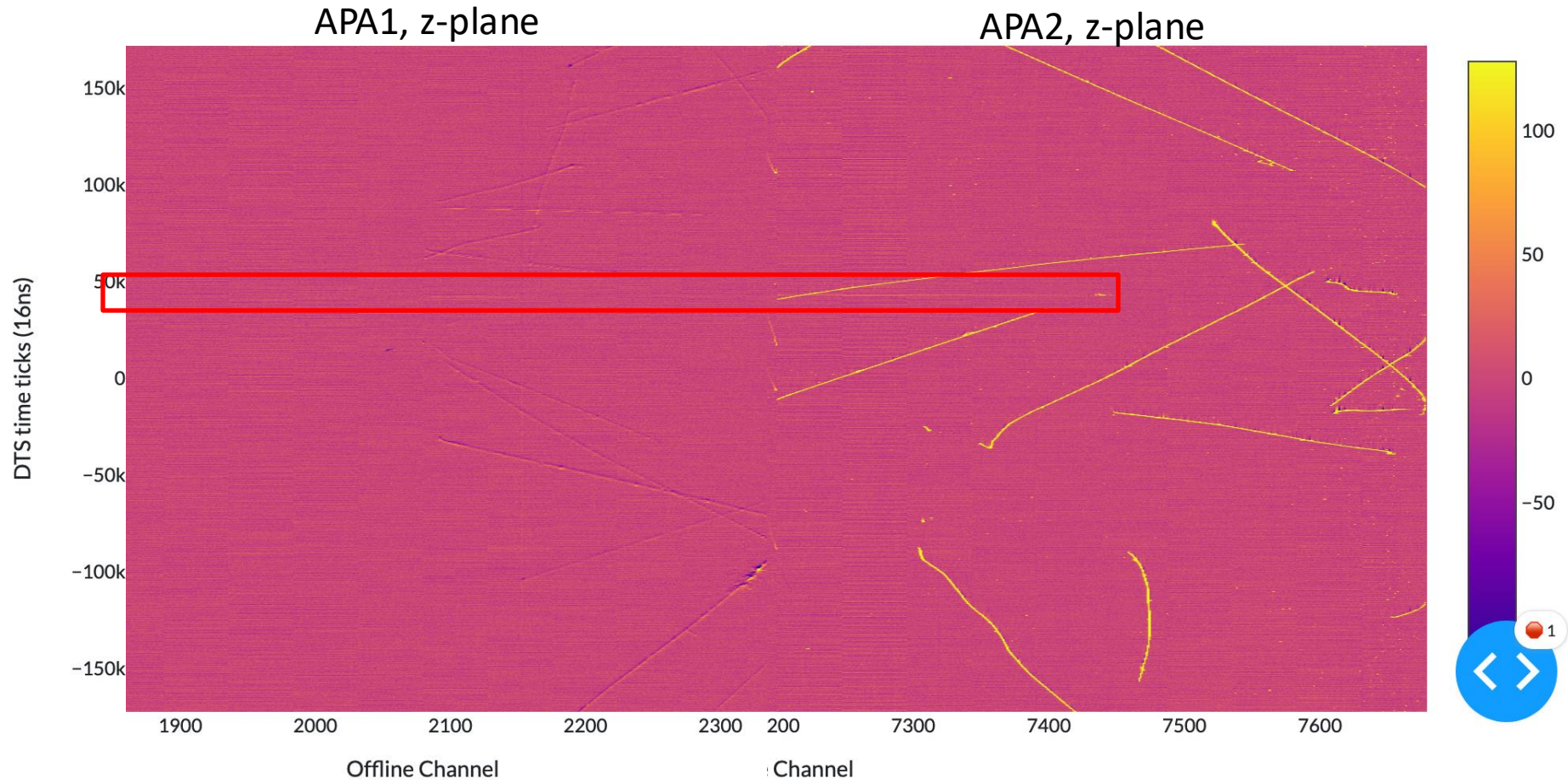
# P1-Parallel APA tracks (Oct. 23)

- Parallel tracks easy w/ P1
  - Rotated 25 degrees in opposite direction from previous run

# P1 Upstream-Going Tracks

## Run31437, Trigger 6720

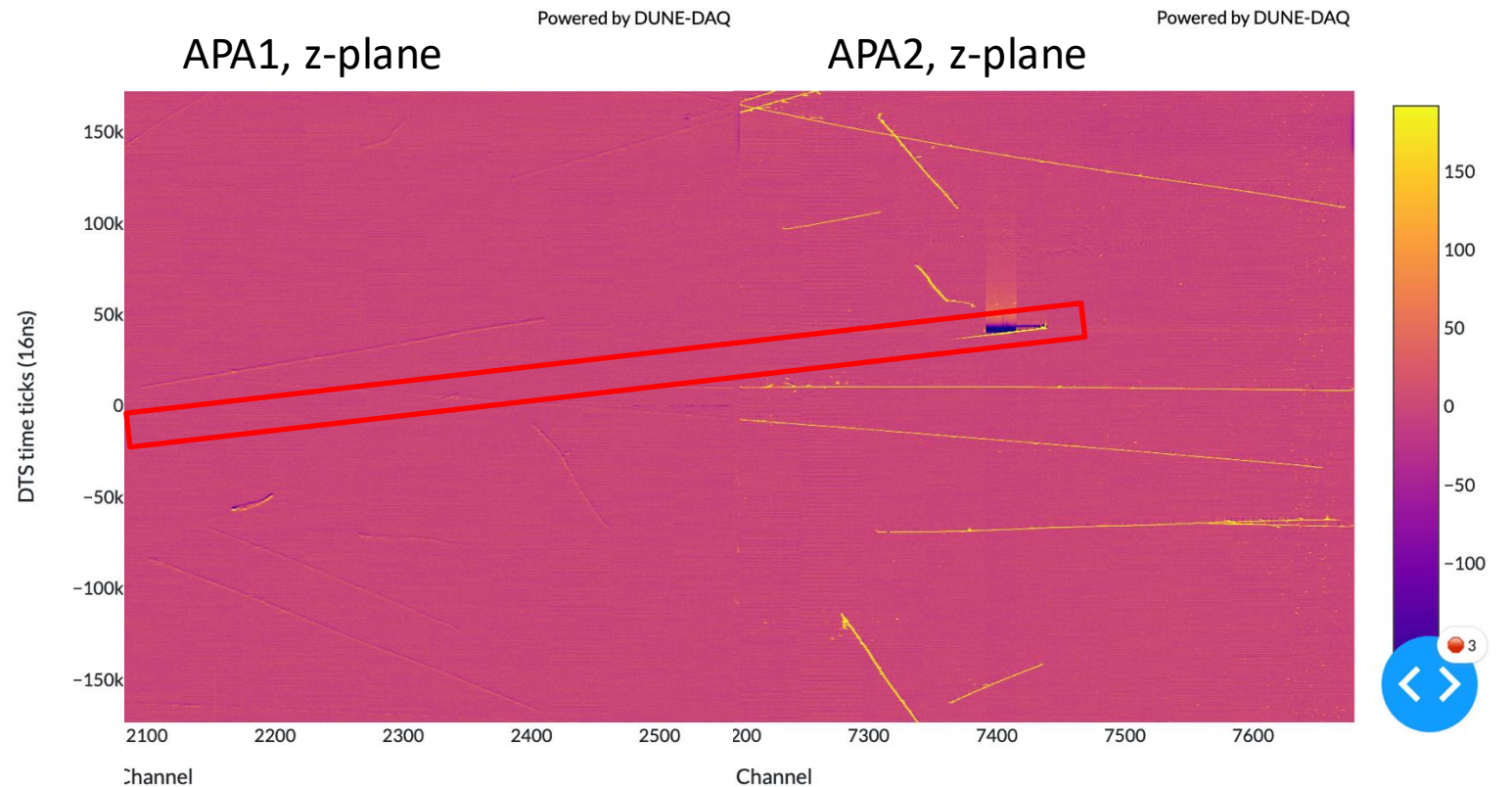
Powered by DUNE-DAQ



# P1 PINDiode tracks (Oct. 24)

## Run319, Trigger 6720

- Used the geoNavigator to generate the coordinates for any PINdiodes visible to P1
- Partial track and large signal observed in the right channel



# Monday, Oct 28

- Aimed P2 at PINdiode module 6, sitting under the field cage, and below P1
  - Managed to hit CH2 and CH8
    - Only partial hits
    - Not able to see nice tracks – beam might be clipping



# Tuesday Oct. 29

- Using the Slow Controls server and OPC UA client to execute scans w/ P2 while recording motor positions and timestamps for each trigger
- Huge milestone

The screenshot shows a terminal window on the left with the following content:

```

Command Terminal
INFO pause
INFO Pause the system. This will *keep* the laser firing, but shutter is closed.
INFO standby
INFO Pause the system. This will close the internal shutter and stop QSWITCH.
INFO resume
INFO Resume the system. This will open the shutters and start QSWITCH.
INFO stop
INFO Stop the system. This will stop the system (fire, qswitch, and return shutters to default position).
INFO fire_at_position <position> <num_shots>
INFO Fire at a specified position. Number of shots is optional.
INFO Example: fire_at_position [1,2,3] 10
INFO fire_segment <start_position> <end_position>
INFO Fire at a segment between two positions.
INFO Example: fire_segment [1,2,3] [4,5,6]
INFO execute_scan <run_plan>
INFO Execute a scan plan. The run plan should be a JSON object with a 'scan_plan' array.
INFO Example: execute_scan '{"scan_plan":[{"start":[1,2,3],"end":[4,5,6]},{"start":[7,8,9],"end":[10,11,12]}]}'
INFO read_variable <variable>
INFO Read the value of a variable. Variable must be a fully qualified OPC-UA node
INFO set_pm_range <setting>
INFO Check the variable LSI.PMI.range_options for reference
INFO set_pm_threshold <setting>
INFO Threshold should be something above 100 (units of 0.01%)
INFO set_att_position <setting>
INFO Position should be a value in [-10000; 10000]
INFO set_dac <value>
INFO Value cannot be above 4095
INFO clear_error
INFO Clears IoLS error state, returning task messages
INFO exit
INFO Exit the program
INFO >> pause
INFO Method called successfully. Returned 1 arguments (1 expected)
INFO [INFO]:laser:pause : Laser operation paused.
INFO [INFO]:pause:ioIs : Command successful.
INFO Pause successful.
INFO >> execute_scan '{"scan_plan":[{"start":[101702,592486,17602],"end":[101702,592486,18802]},{"start":[101702,593137,17602],"end":[101702,593137,18602]}]}'
INFO [INFO]:validate_scan:ioIs : Configuration validated.
INFO [INFO]:execute_scan:ioIs : Command successful.
INFO Execute scan successful.

```

The dashboard on the right shows the following status:

- IoLS Monitoring**
- Status Monitor** (You are screen sharing)
- Components: RNN800 (ready), LSTAGE (ready), PM1 (operating), IoLS (operating), RNN600 (ready), A1 (ready), L1 (lasing)
- Motor: [101701, 592485, 17629]
- CIB: [101702, 592485, 18014]
- Attenuator position: 3050
- DAC: 400
- Laser status code: 00
- Power Meter: energy: 0.000202 J, average: 0.000202 J
- Laser Timers: Warmup timer: 0 s, Standby timer: 0 s, Pause timer: 0 s
- Laser Part States: ESH OPEN: [X], LSH OPEN: [X], FIRE: [X], QSWITCH: [X]

RUN32462		Motor Positions		
Trigger Number	TIMESTAMP	RNN800	RNN600	LSTAGE
1	108137779698264923	101702	592485	17613
2	108137779704514923	101702	592485	17615
3	108137779710764923	101702	592485	17617
4	108137779717014923	101702	592485	17619
5	108137779723264923	101702	592485	17621
6	108137779729514923	101702	592485	17623
7	108137779735764923	101702	592485	17625
8	108137779742014923	101702	592485	17627
9	108137779748264923	101702	592485	17629
10	108137779754514923	101702	592485	17631
11	108137779760764923	101702	592485	17633
12	108137779767014923	101702	592485	17635
13	108137779773264923	101702	592485	17637
14	108137779779514923	101702	592485	17639
15	108137779785764923	101702	592485	17641
16	108137779792014923	101702	592485	17643
17	108137779798264923	101702	592485	17645
18	108137779804514923	101702	592485	17647
19	108137779810764923	101702	592485	17649

- P2 energy peaks at the beginning
- The anomalous events most common in the first few tens of triggers at the start of the run

