

NP04 TCO Closure Checks TPC Electronics

Roger Huang
FD1 Technical Board Meeting 11/8



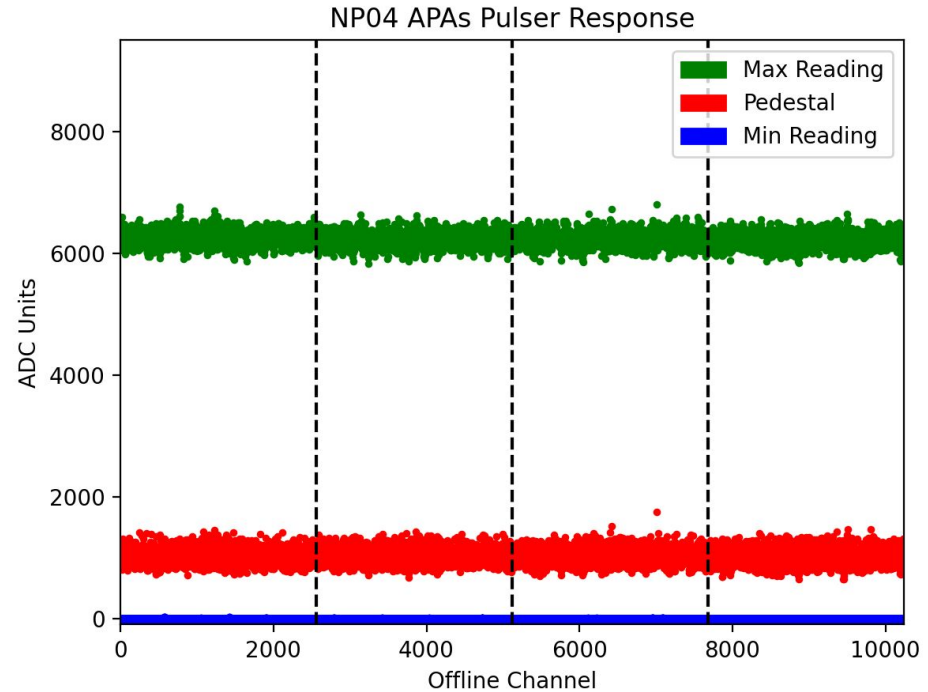
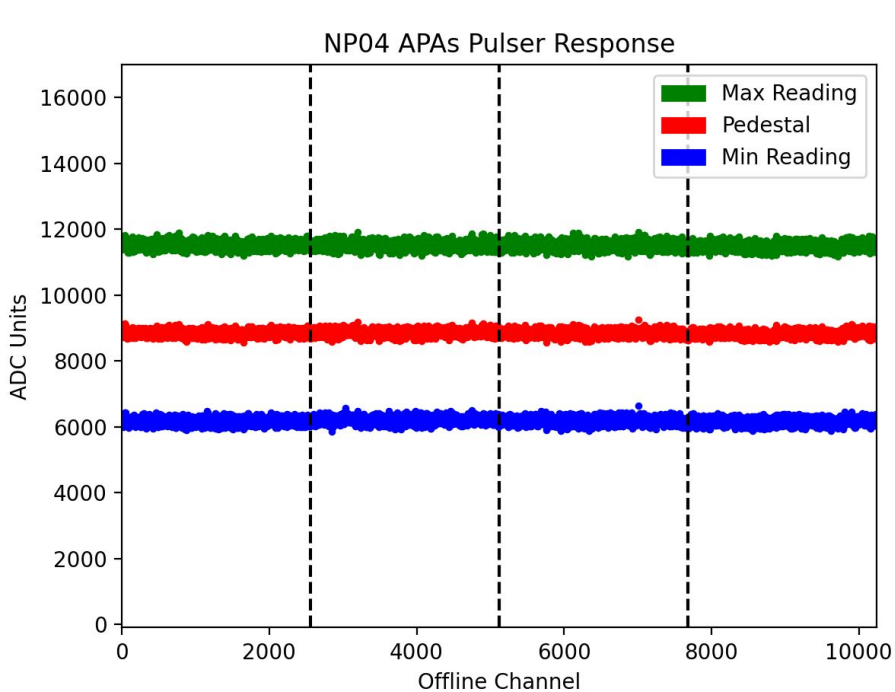
NP04 TCO Closure TPC Electronics Checklist

List of items to check before TCO closure begins:

- Detector ground isolation
 - The grounding has been confirmed to be good, although temporary shorts will frequently be made while the TCO closure is being done
- Electronics response and connectivity for all channels
- Stability of electronics data over 24 hours
- Noise checks with PDS and other cryogenic instrumentation
- Wire bias tests up to 100 V
 - Done by biasing one APA at a time, all 3 layers at once

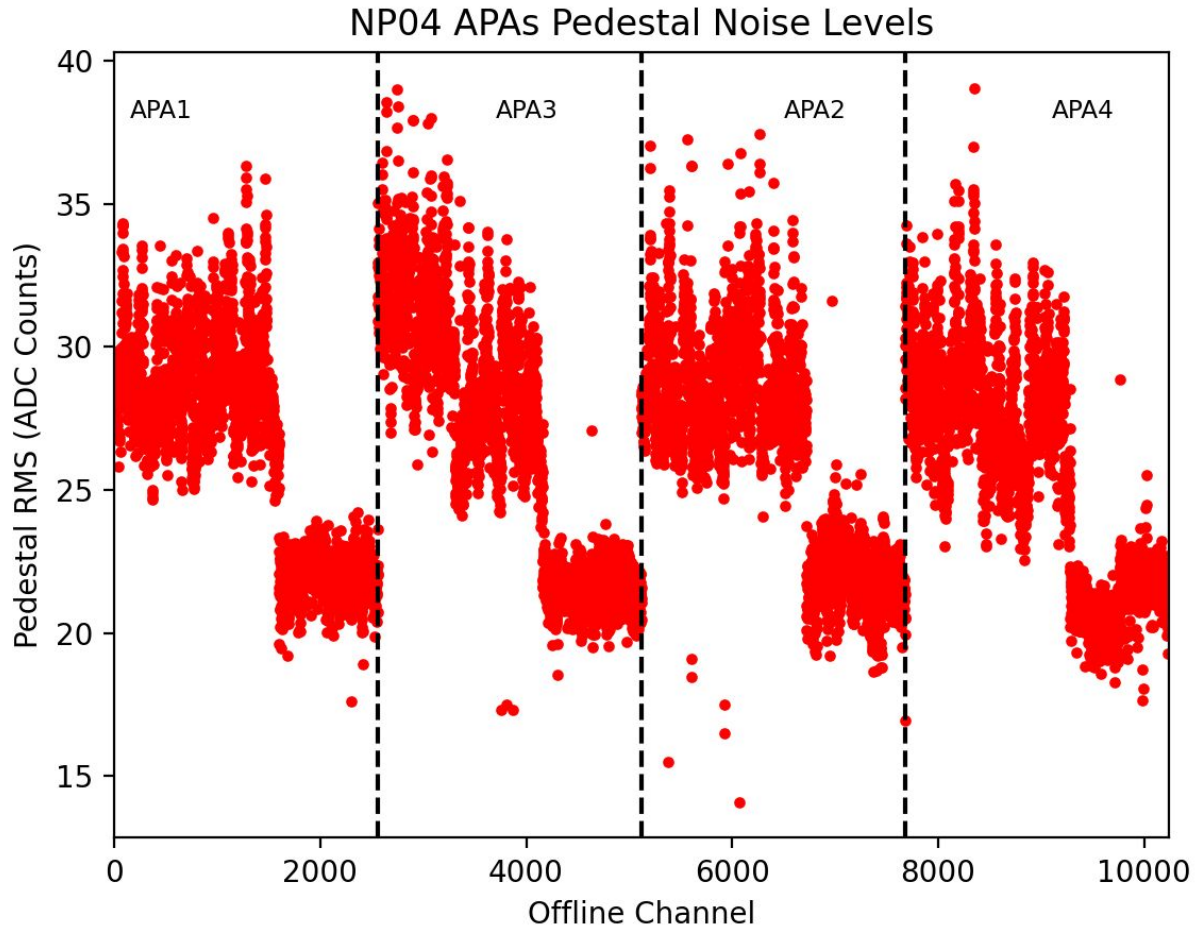
Pulser Checks

- Pulser data at high and low baselines looks as expected for all channels



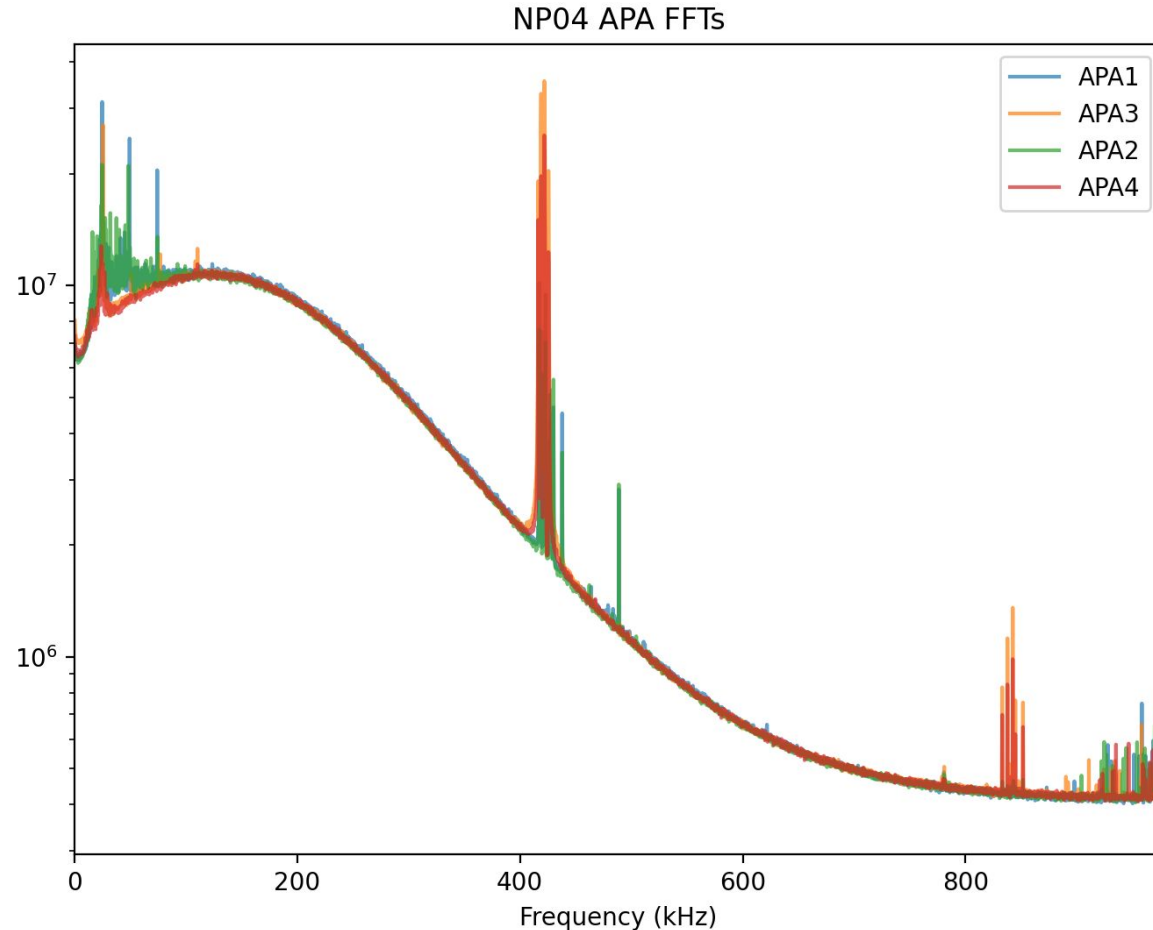
Noise Checks

- Pedestal noise levels are all about as expected for warm conditions
- Low-noise channels match the missing wires seen from the coldbox tests
- Note: APA3 is closest to TCO



Noise Checks

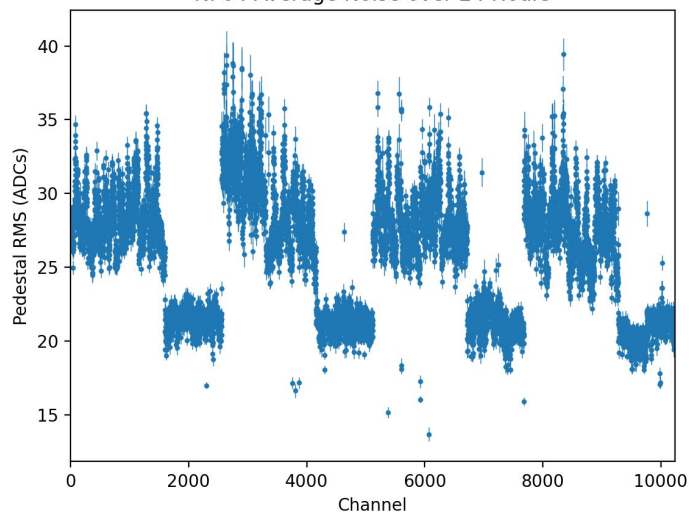
- Typical coherent pickup around 25 kHz still seen in all APAs
- Large peak around 400 kHz is believed to be environmental pickup, and has been generally present in NP04



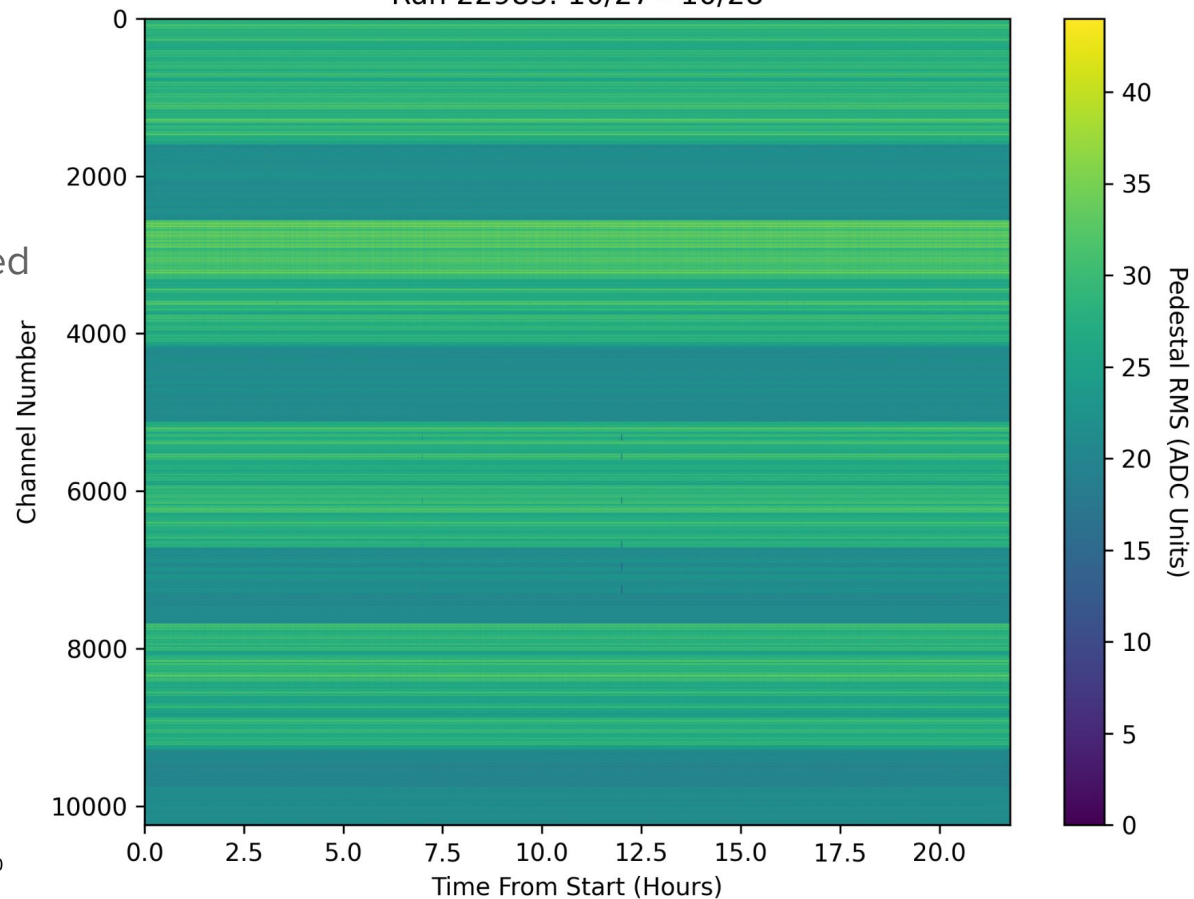
Noise Stability

- 24-hour run showed stable response
- Rare instances of dropped frames were seen, but believed to be DAQ-side issue

NP04 Average Noise over 24 Hours

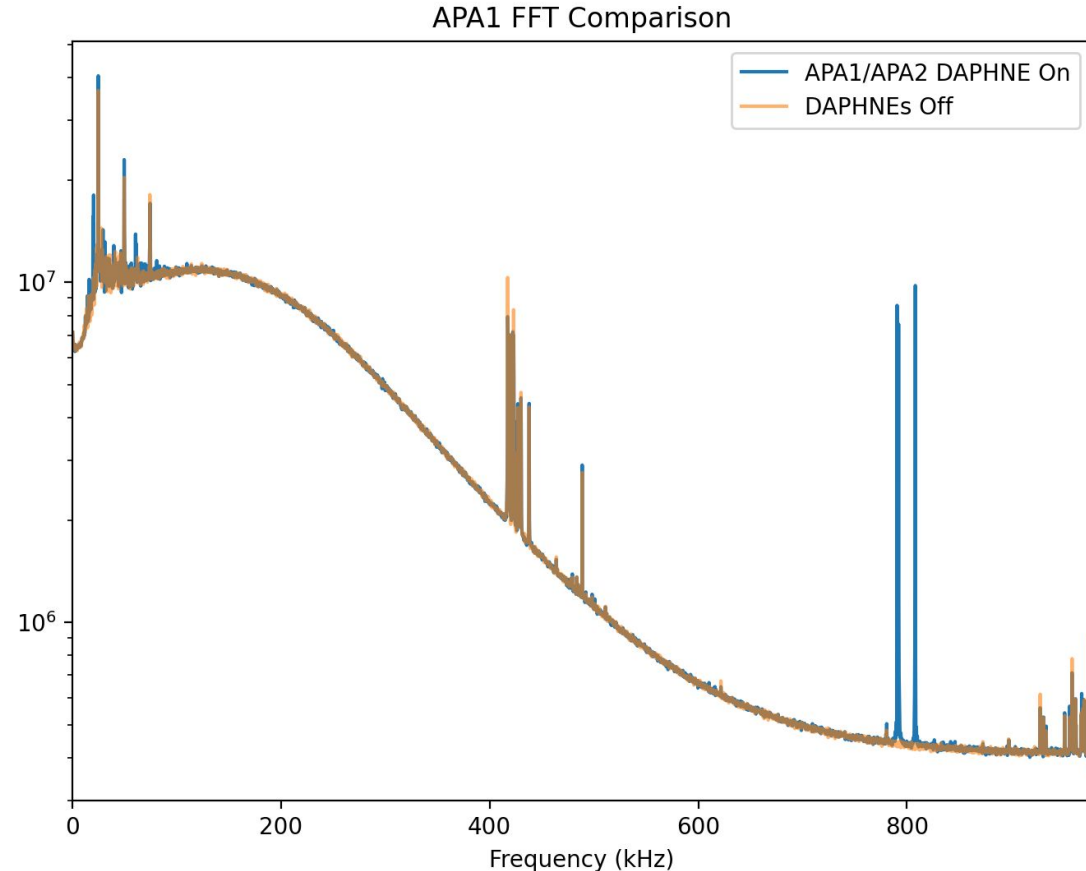


NP04 APA Noise Monitor
Run 22983: 10/27 - 10/28



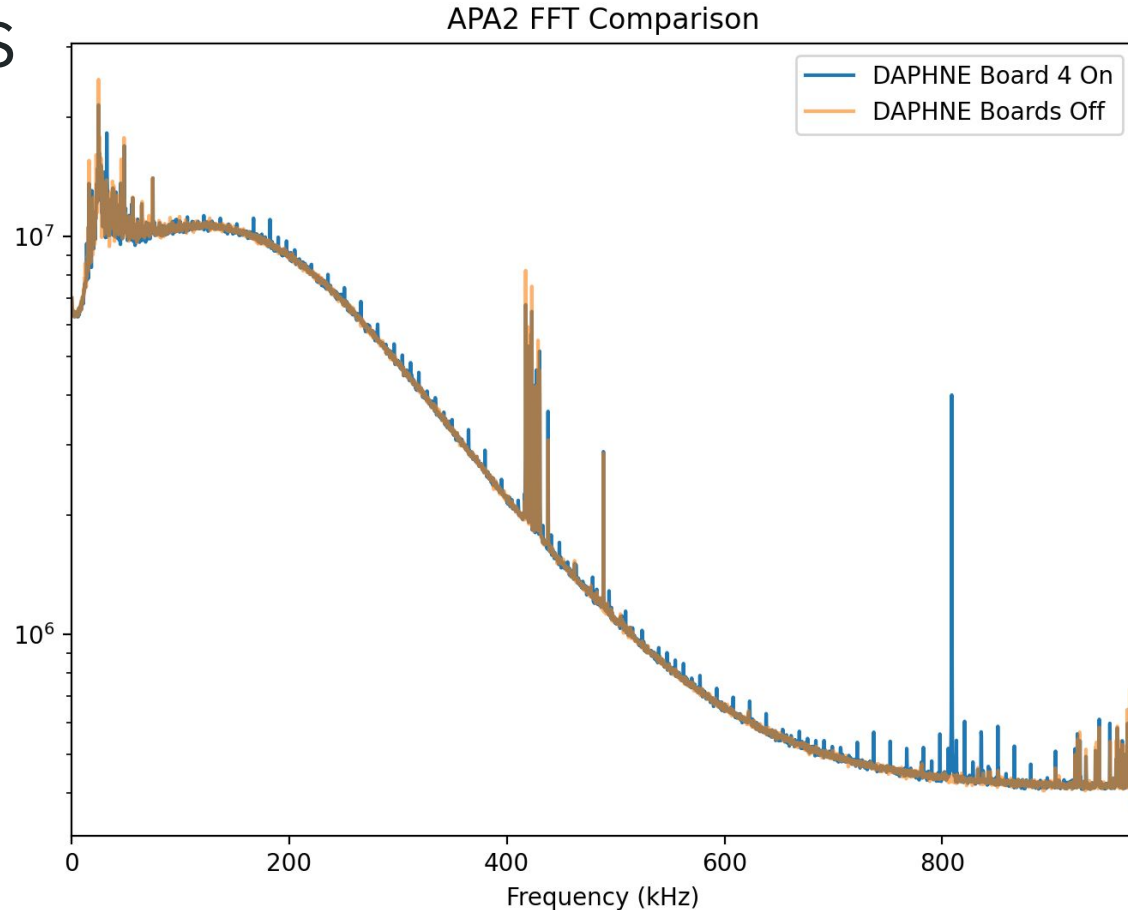
Noise Checks with PDS

- Powering on PDS DAPHNEs induces noise peaks around 800 kHz in the APAs sharing the same penetration
- Powering on only APA1 DAPHNEs will still cause noise in both APA1 and APA2 TPC electronics
 - Suggests noise is coming in at the warm/WIB level
- PD group has an understanding of how this comes from their DC/DC switching and grounding scheme and is investigating



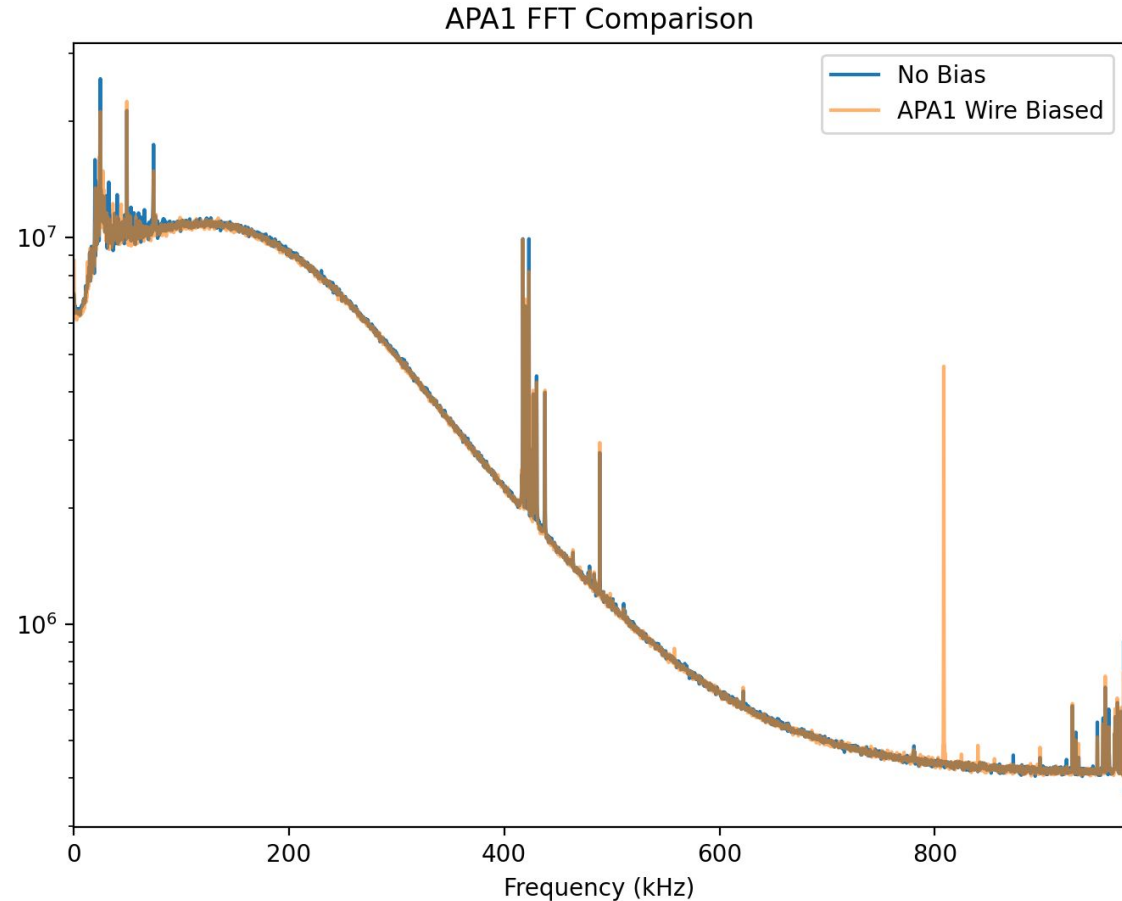
Noise Checks with PDS

- PD group has also identified a bad cable on APA2
- When that cable is plugged in and the corresponding DAPHNE powered on, APA2 sees a bunch of extra noise peaks



Wire Bias Tests

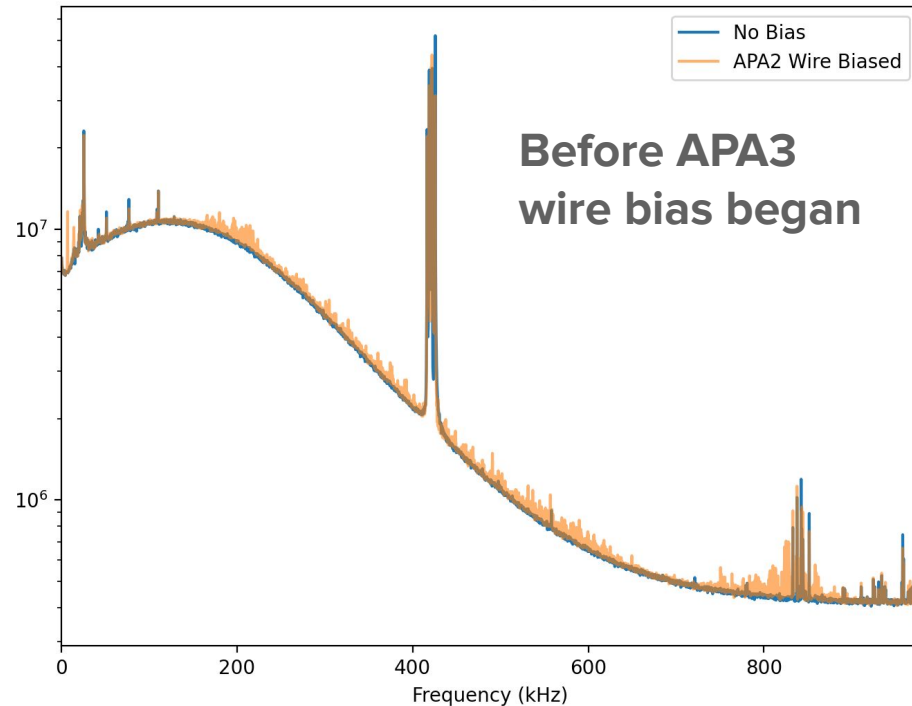
- Leakage currents remained low throughout the bias tests
 - ~ 1 μA during ramp-up
 - < 10 - 100 nA at 100 V
- No notable effects on TPC electronics response
 - Wire bias levels were too low to attempt to replicate the effects seen during coldbox tests though



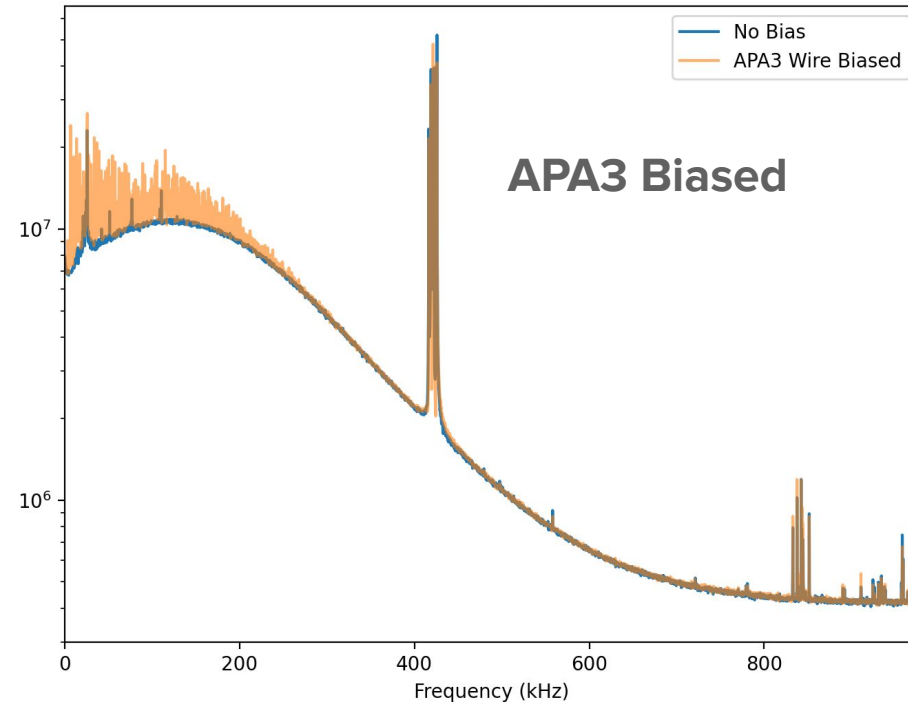
Wire Bias Tests

- APA3 saw some unusual noise during its wire bias tests, but it's possible this was an unrelated environmental factor
 - Begun even before APA3 wire bias was applied

APA3 FFT Comparison



APA3 FFT Comparison



Summary

- TCO closure checklist items for TPC electronics have been completed without issue
- Only remaining task is to close the flanges - expect this to be done within the next couple of weeks
- We will continue to run frequent checks on electronics response and noise
- Currently no plans to frequently re-run the wire bias test