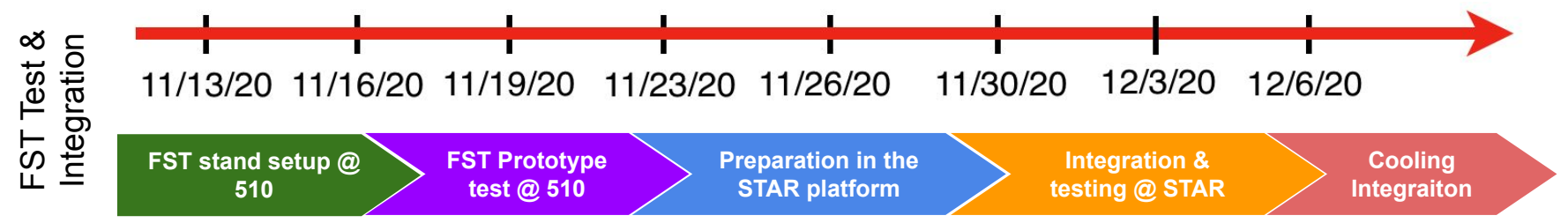


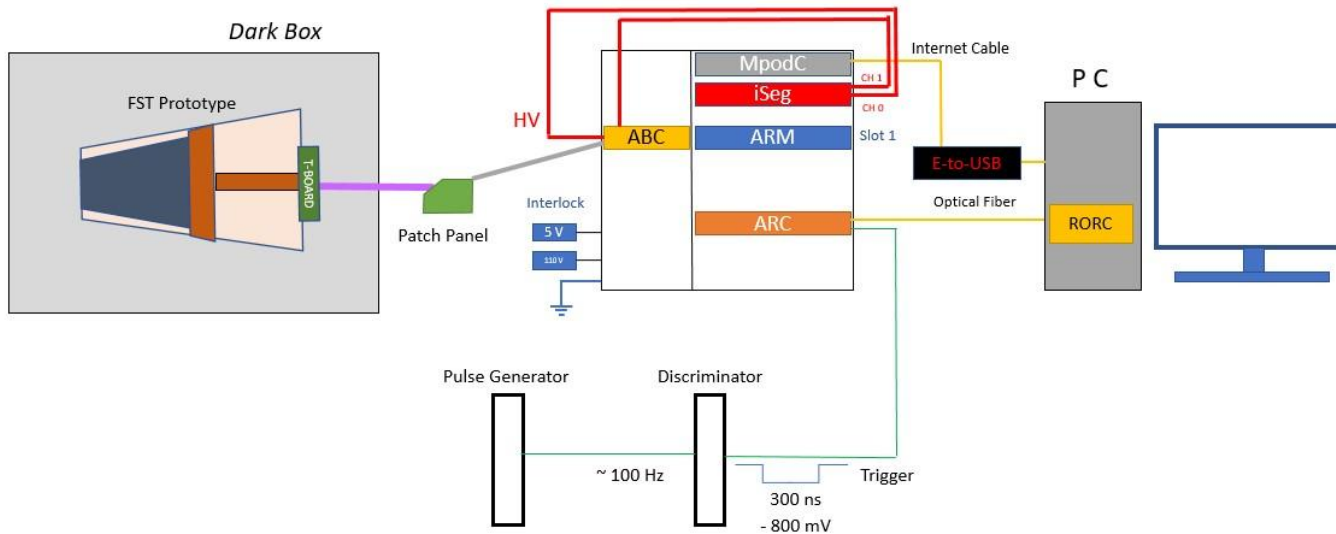
Report on FST Integration Test at BNL

For more info please visit: <https://drupal.star.bnl.gov/STAR/blog/ptribedy/fst-testing-bnl>

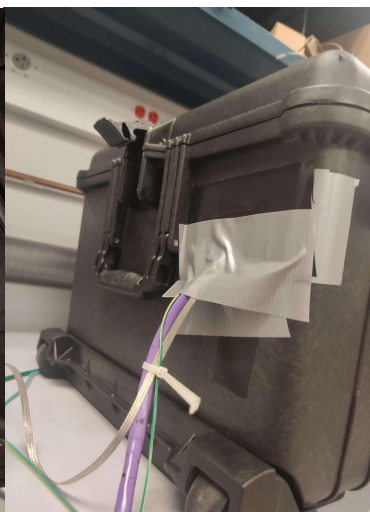
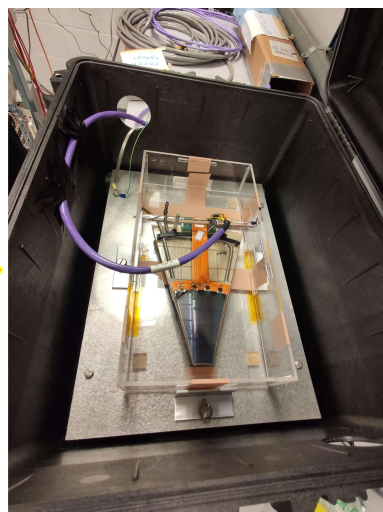
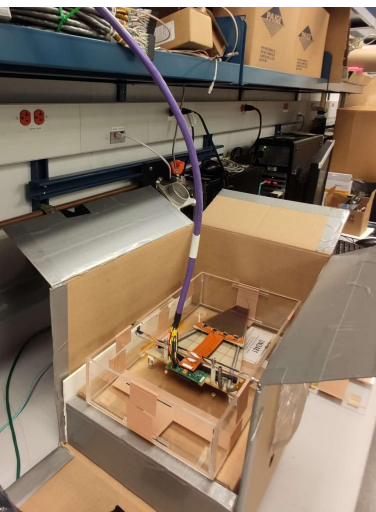
Yu Hu, Xu Sun, Prithwish Tribedy, Flemming Videbaek, Rahul Sharma



FST Prototype Test @ 510



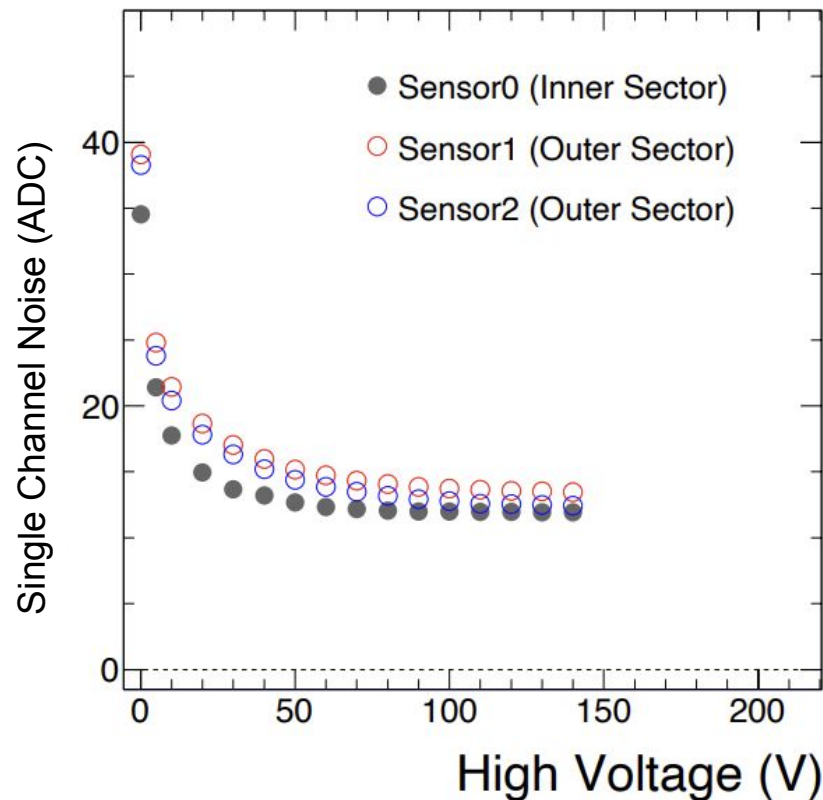
1. Noise test with/without grounding
2. Noise test with different trigger rates
3. Noise test with/without HV (0 V or 70 V)
4. Voltage scan (0 to 140 V)



HV Noise Scan Comparison

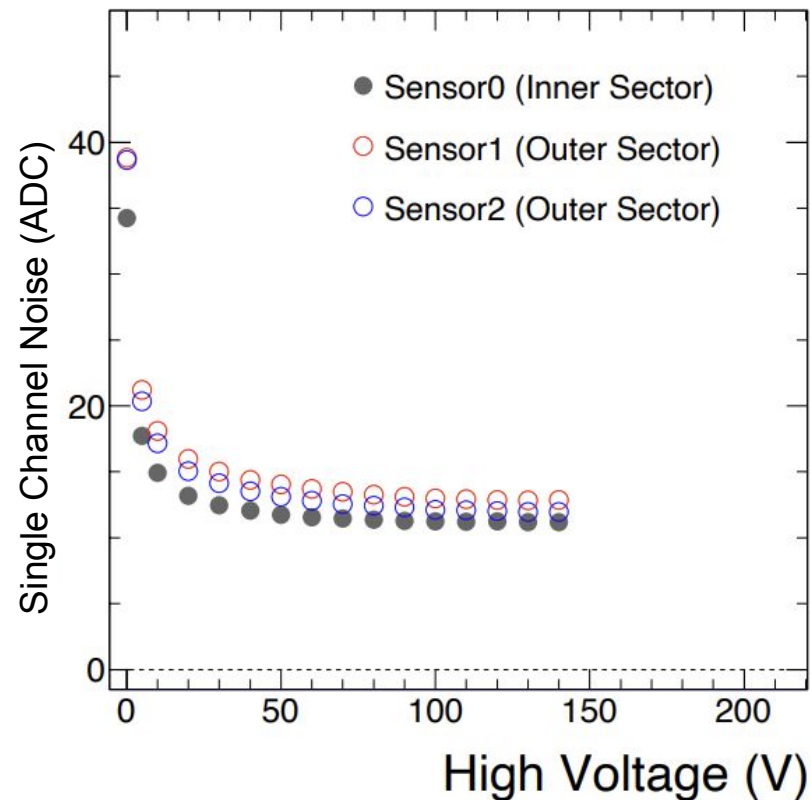
BNL @ 510

Single Channel Random Noise vs. HV @ Mod04



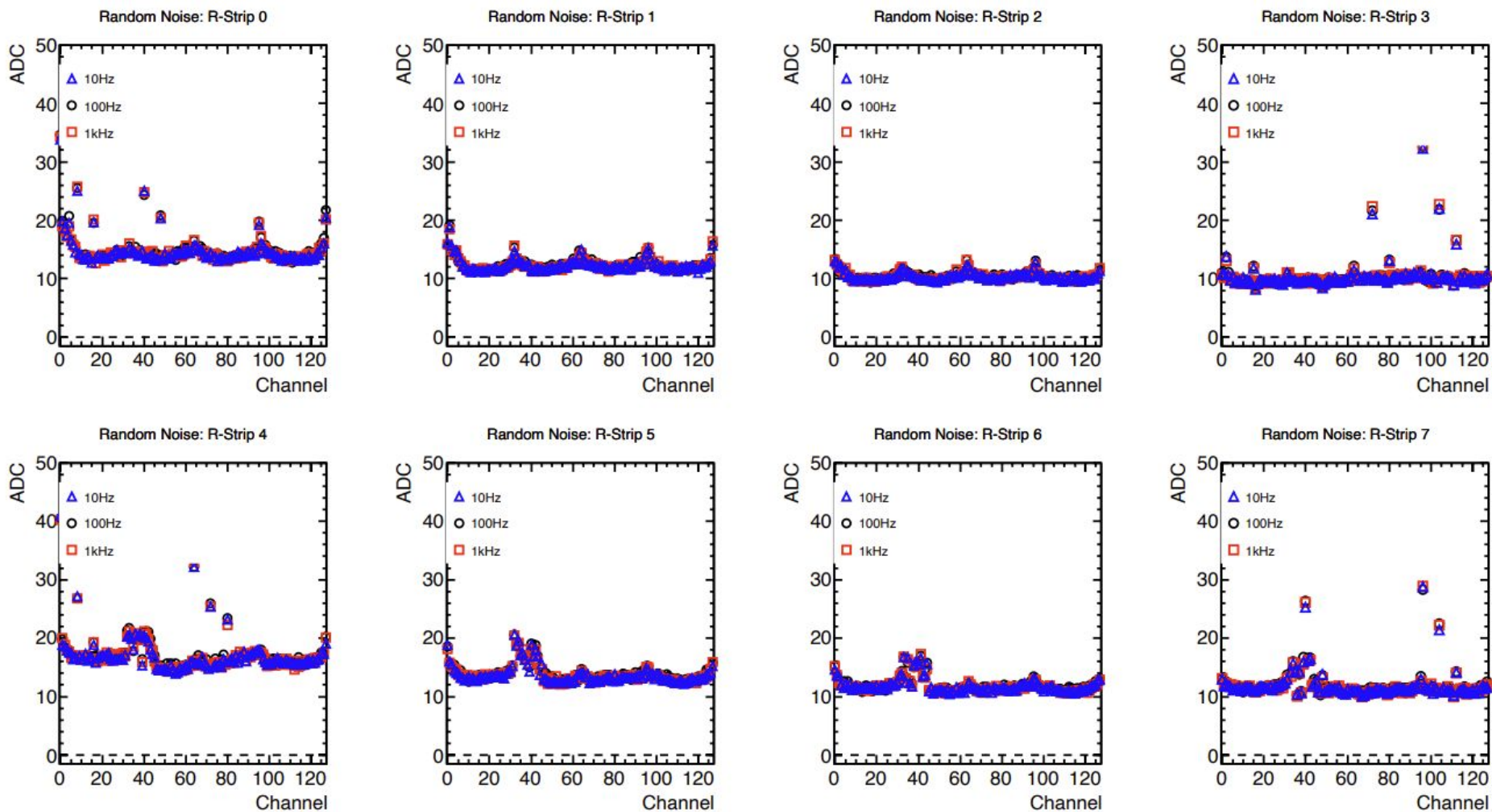
UIC

Single Channel Random Noise vs. HV @ Mod04



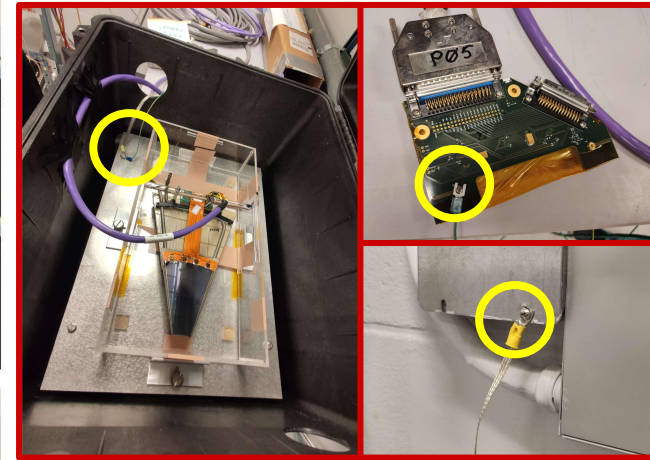
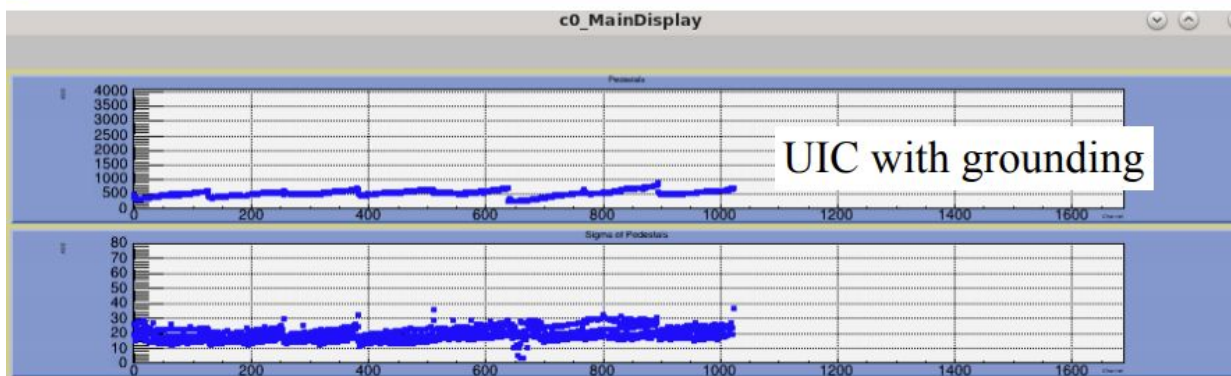
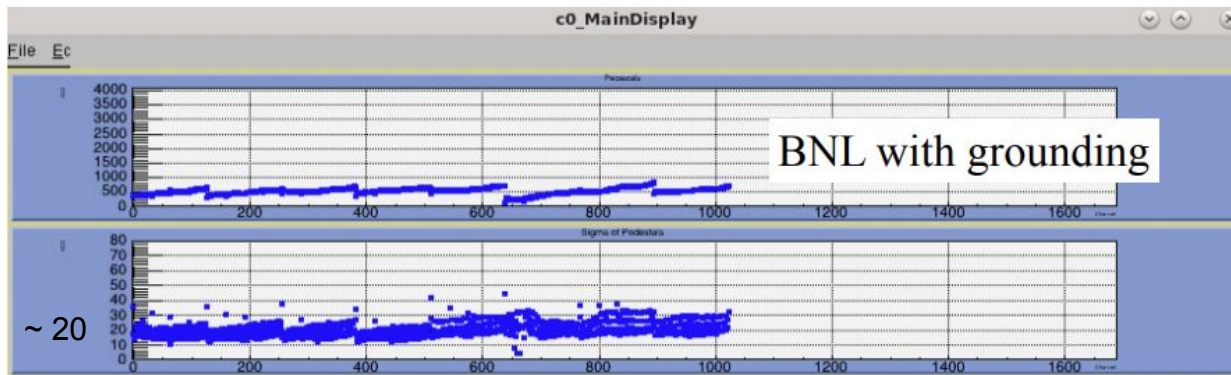
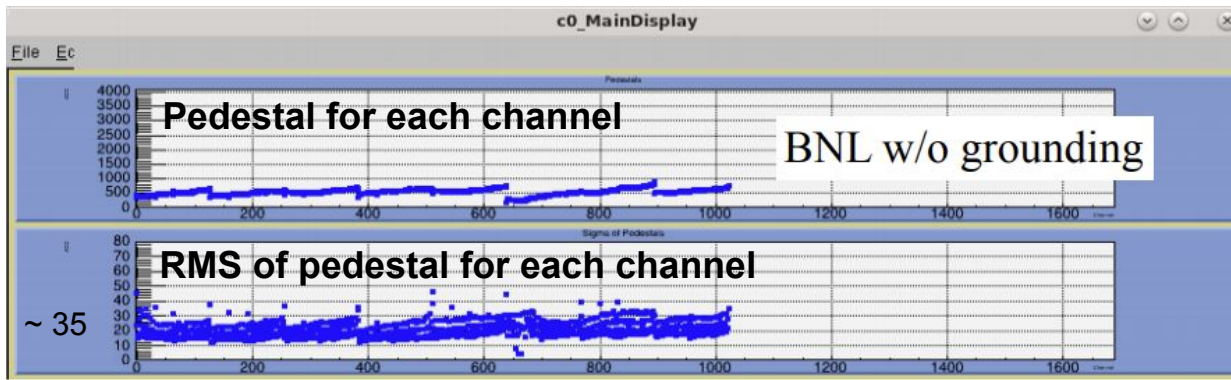
- Noise vs. HV shows the same structure & noise @ BNL is slightly higher than UIC

Noise with Different Trigger Rates



- Noise with different trigger rates (10Hz, 100Hz and 1kHz) show the same behavior

Noise Readout Test with/without Grounding



- Grounding reduce the “splitting” of noise at BNL setup.
- The noise of inner sensor improves more than outer sensor.
- The same setup has been used in the integration test.

FST Prototype Integration Test @ STAR

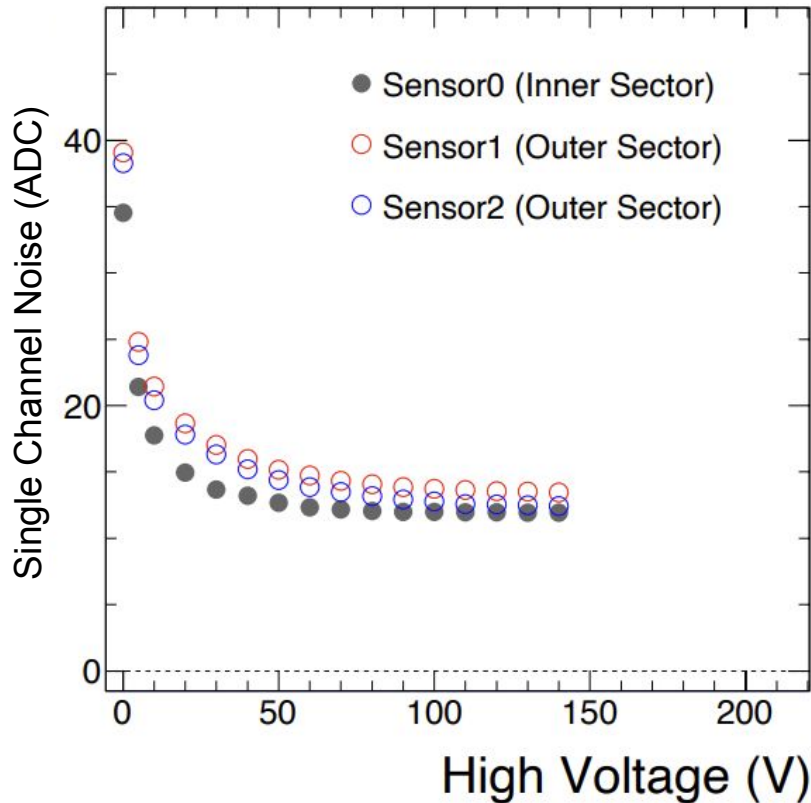


- Setup a dark box with FST module on 3rd floor and the grounding to FST crate #2. (with the help of Christian)
- Power up crate and test the fiber. Test Trigger/TCD interface and generate a bunch of events for us to have a look (with the help of Tonko and Gerard).
- Re-assigned IP address for FST MPOD01-03 (with the help of Wayne). Identify the PC (softioc4) for FST slow control and could operate FST Crate MPOD02 with the slow control scripts.
- Readout FST module & analysis the data. Did noise HV scan (0 V ~ 70 V) with STAR DAQ (with the standalone macro from Tonko)
- Adjust max HV to 150-155V for all for all ISEG modules in FST Crates.
- Finished the full noise HV scan with STAR DAQ (0 V ~ 140 V)
- Random trigger test with STAR DAQ
- FST DAQ integration test was a success.

Integration Test: HV Noise Scan

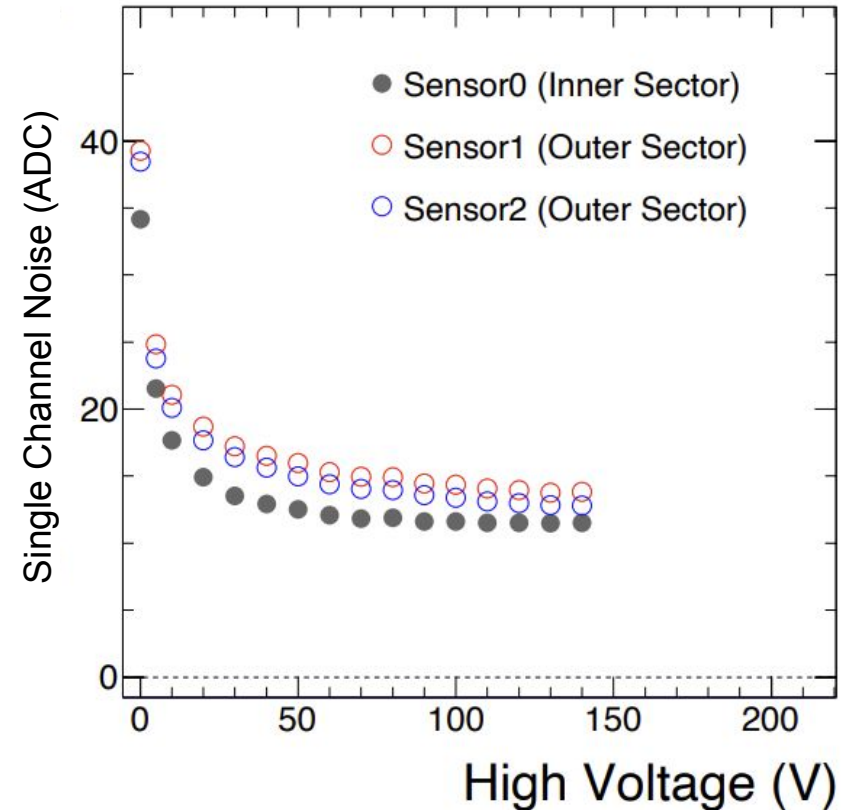
BNL @ 510

Single Channel Random Noise vs. HV @ Mod04



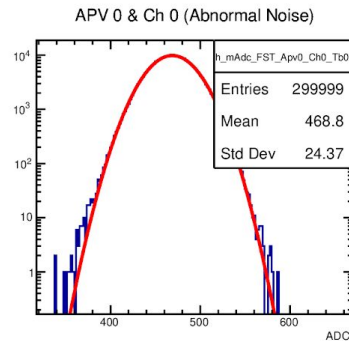
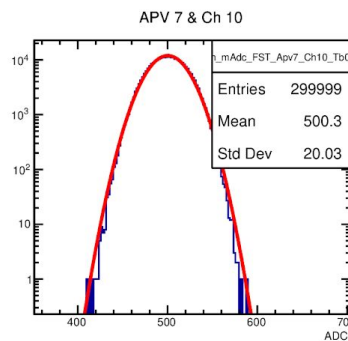
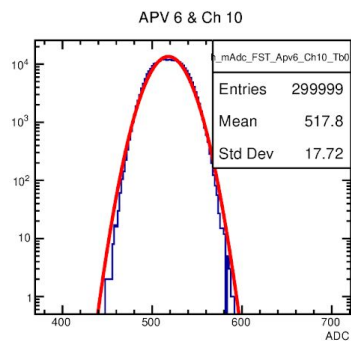
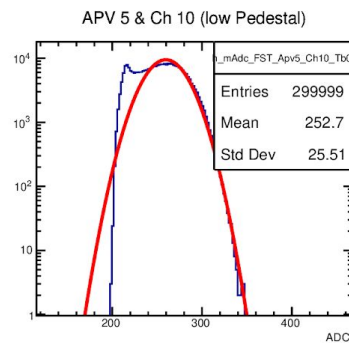
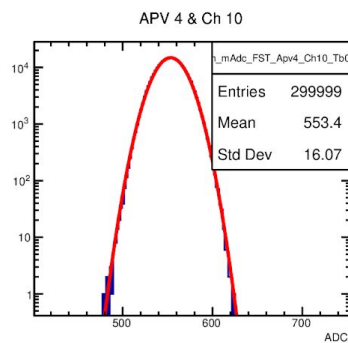
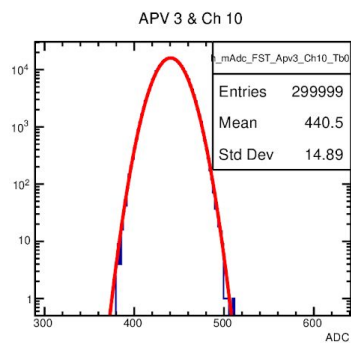
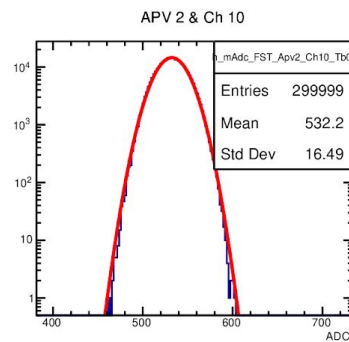
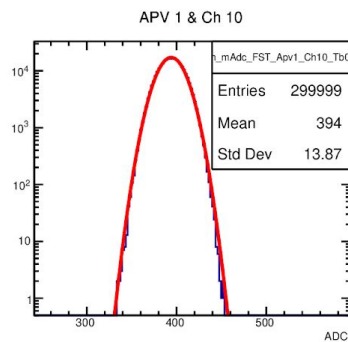
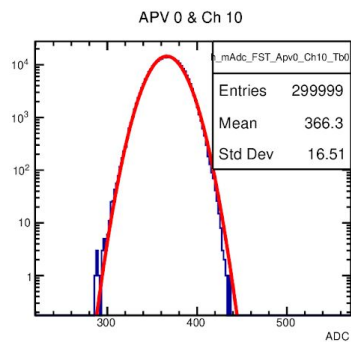
Integration Test @ STAR

Single Channel Random Noise vs. HV @ Mod04

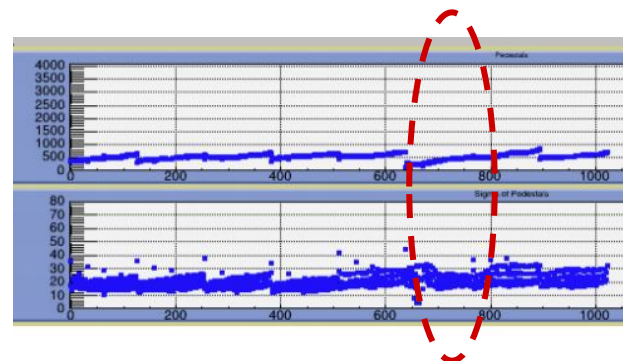


- Noise vs. HV shows the same structure & noise in BNL Test Stand and STAR Integration Test.

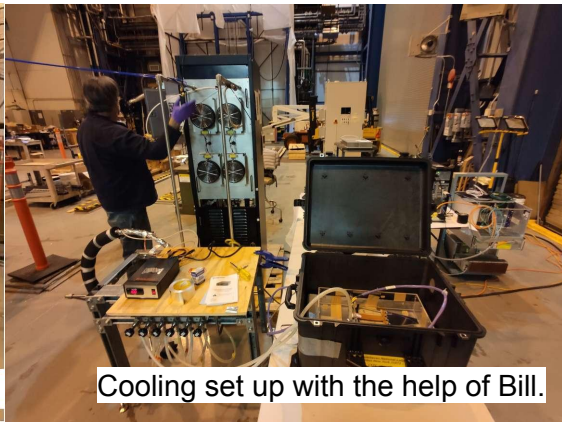
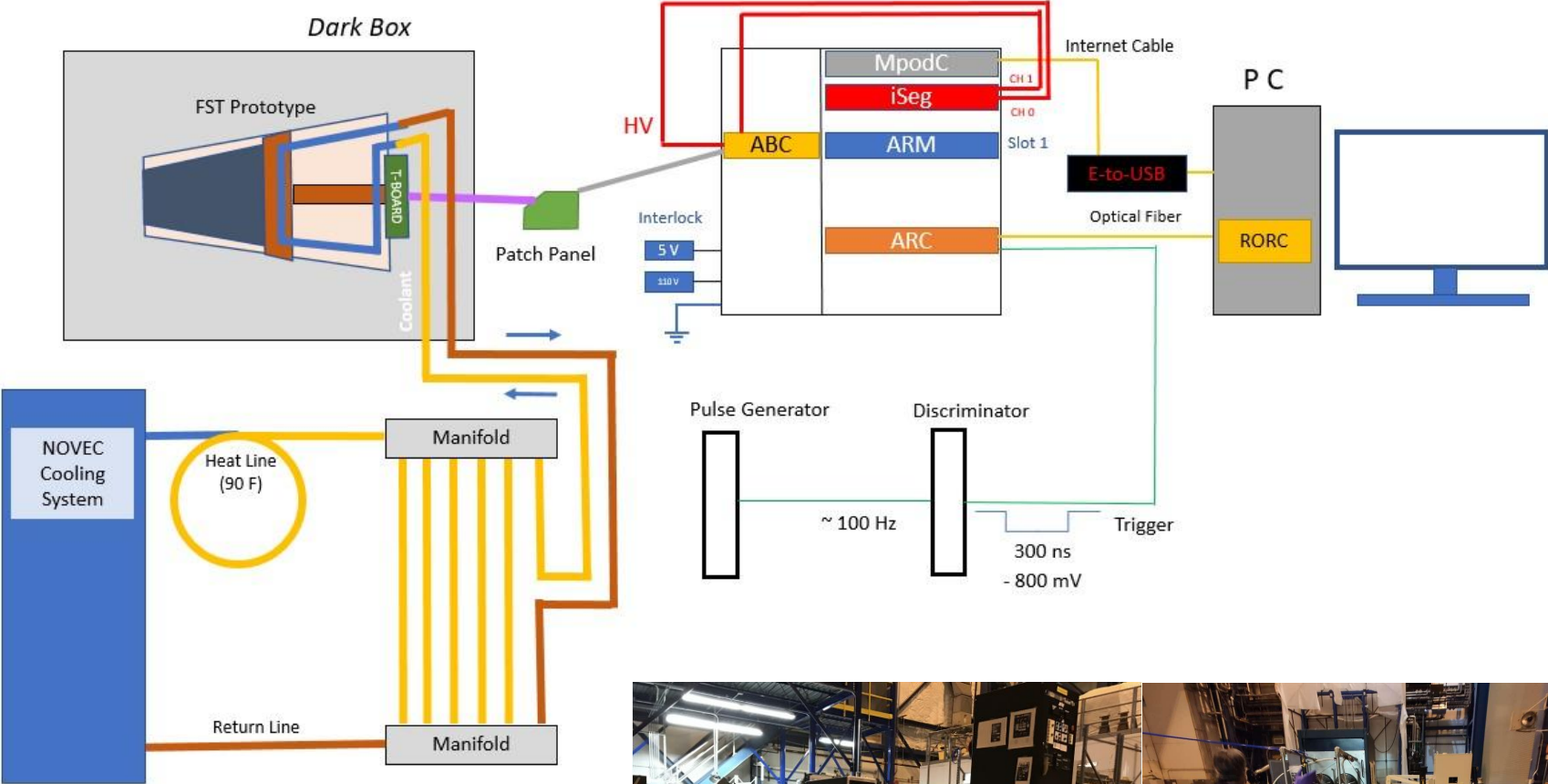
Random Trigger Test



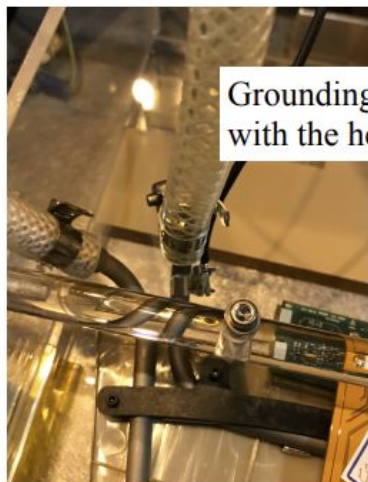
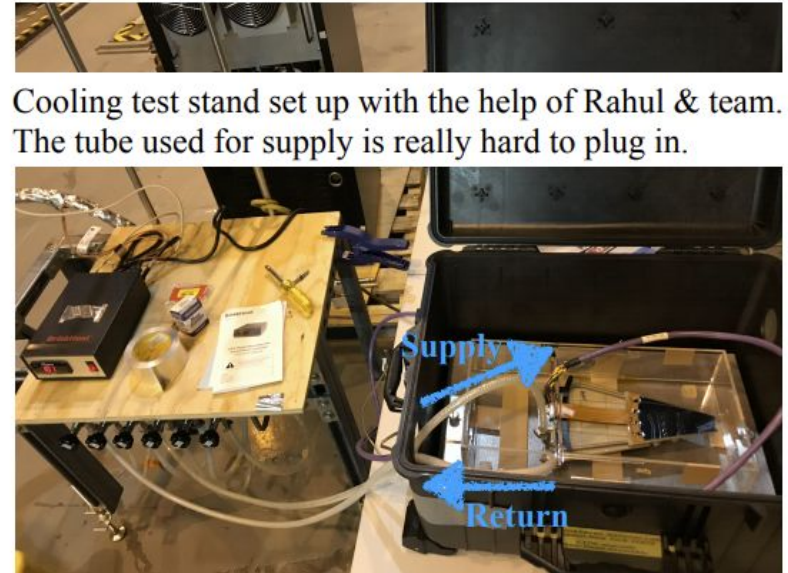
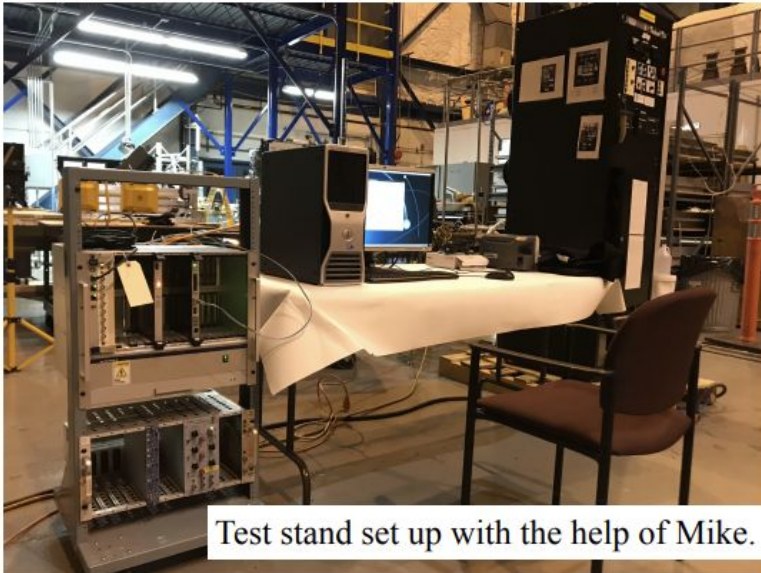
With the random trigger test, we found no strange structure.



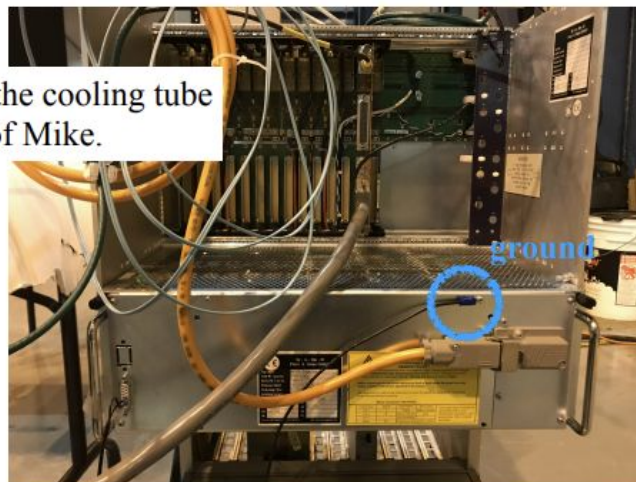
FST Cooling Integration Test



FST Cooling Integration Test

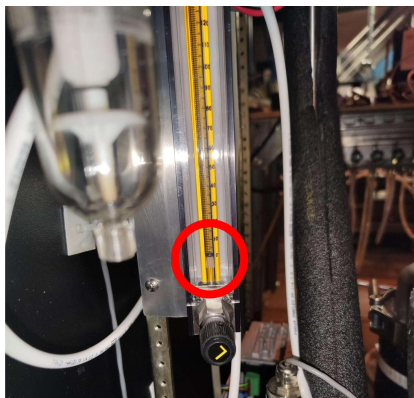


Grounding of the cooling tube with the help of Mike.



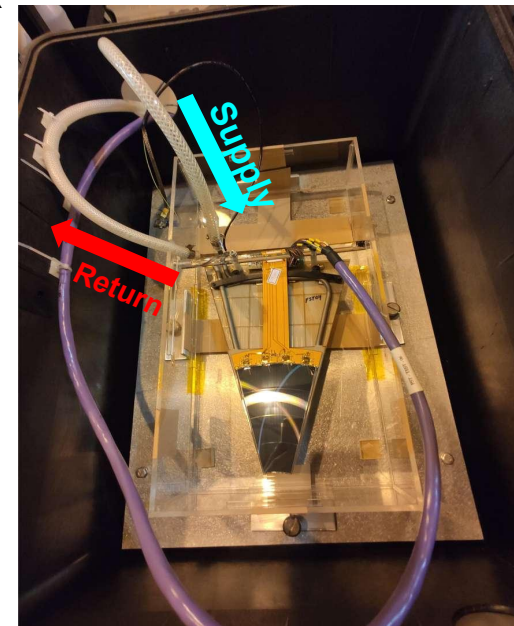
Link to the slides from last meeting: <https://drupal.star.bnl.gov/STAR/system/files/FstIntegrationTestDec07Dec13.pdf>

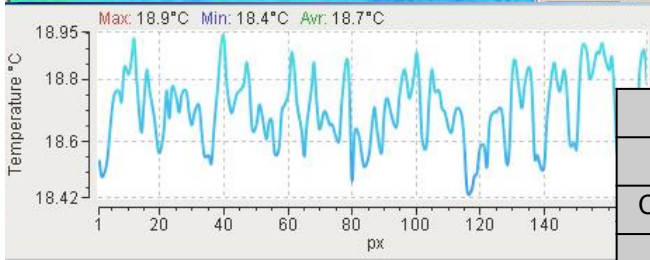
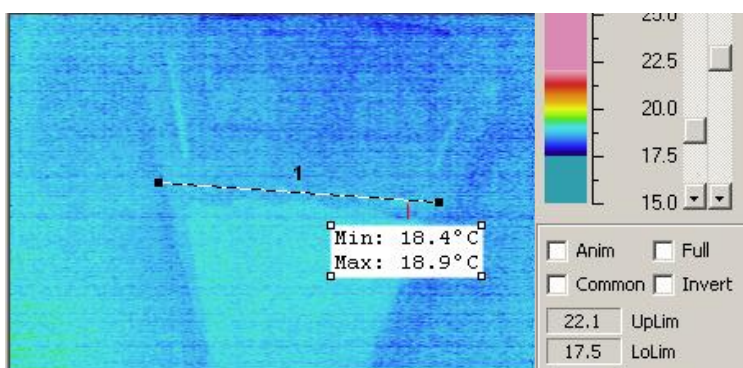
Cooling system



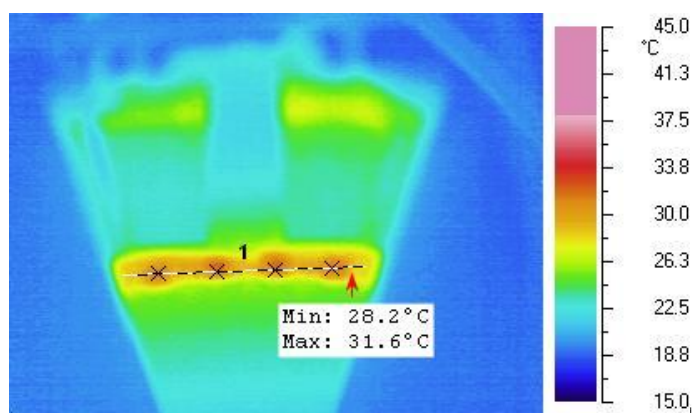
Cooling system:

- Setup proper grounding for the tubes
- Lowest flow we can set on crate: ~ 6 L/min
- 6 loops, we only use 1, other loops are idle, so the flow to our detector < 1 L/min
- Use 2 clamps to avoid leak
- We see stable tank level, conjugate supply & return flow, 0 nitrogen gas flow
--> **No leak**
- Supply tube: Tygon C-544-A I.B. (hard)
- Return tube: Tygon 3370 I.B. (soft)
- Tried maximum flow of ~ 6 L/min (closing other channels) to the prototype for short time, found no leak

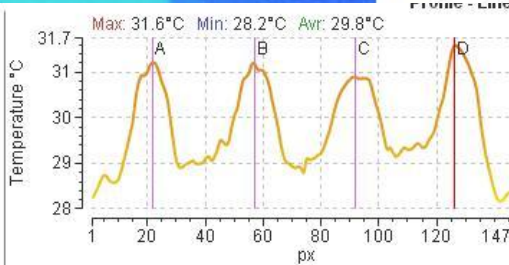




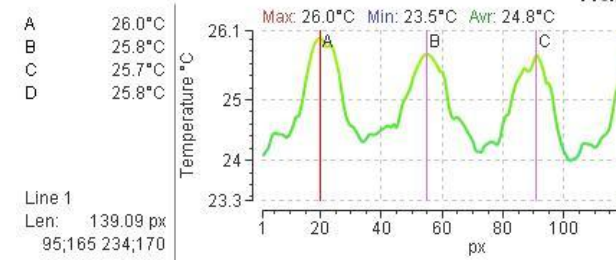
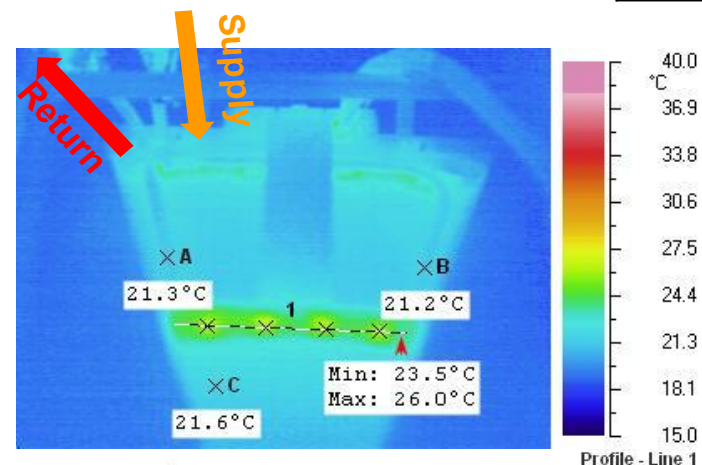
APV	OFF
HV	0 V
Cooling	OFF
@ Time = 0	



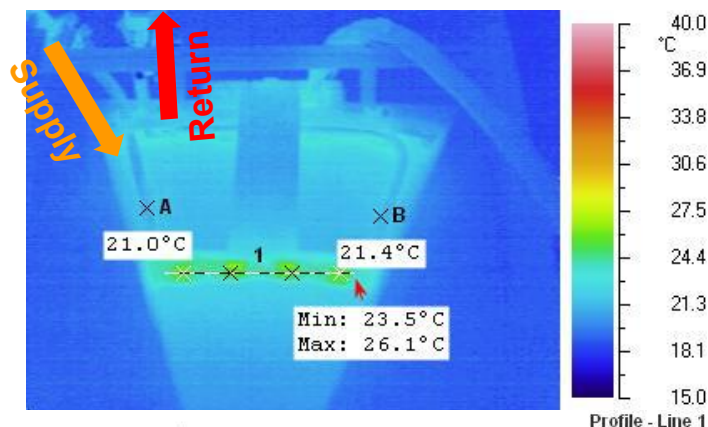
A	31.2°C
B	31.2°C
C	30.9°C
D	31.6°C
Line 1	
Len: 146.086 px	
68;156 214;151	



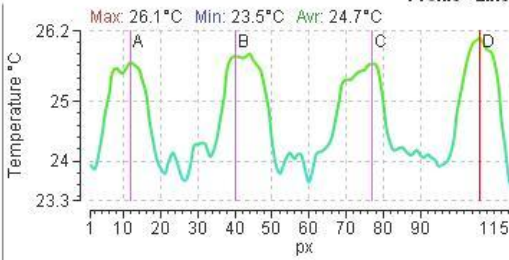
APV	ON
HV	0 V
Cooling	OFF
@ Time = 25	



APV	ON
HV	0 V
Cooling	ON
@ Time = 50	

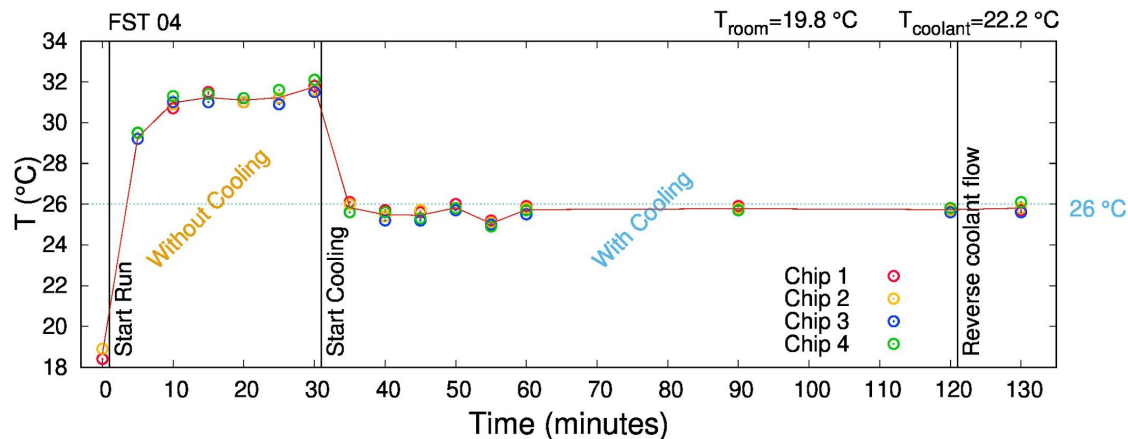


A	25.7°C
B	25.8°C
C	25.6°C
D	26.1°C
Line 1	
Len: 114 px	
83;157 197;157	

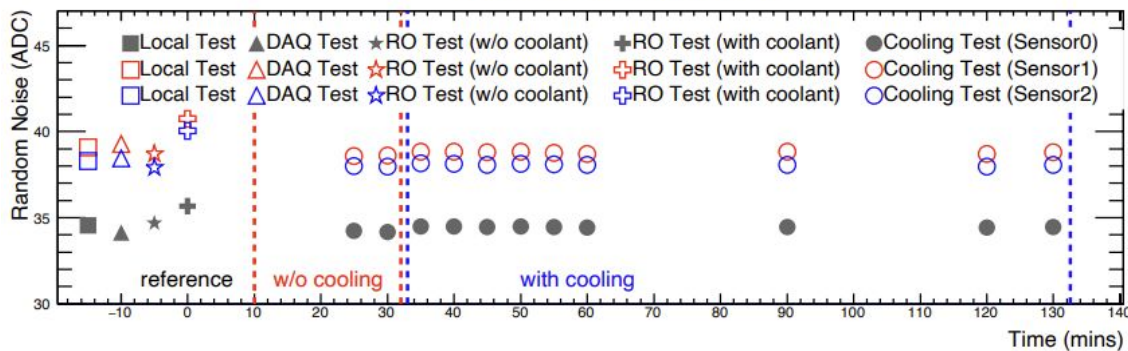


APV	ON
HV	0 V
Cooling	ON
@ Time = 135	

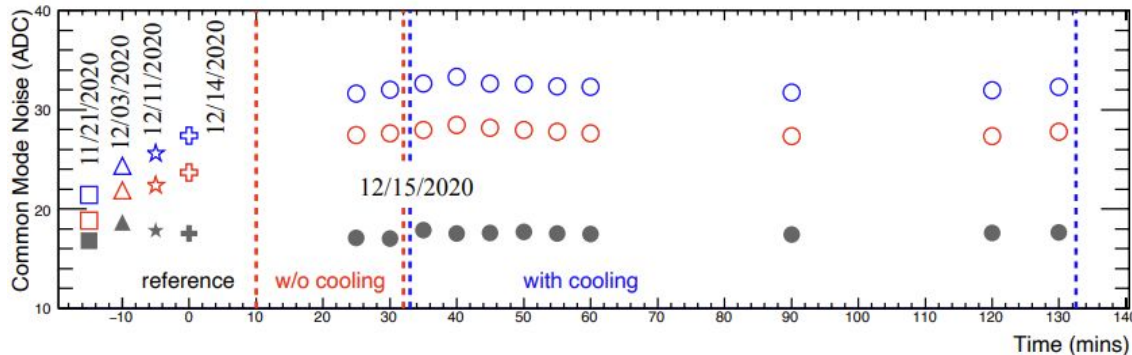
Cooling Efficiency Testing



Random Noise vs. Time (Temperature)



Common Mode Noise vs. Time (Temperature)



- Sensors and other parts showed stable temperature no overheating
- About ~1 L/min flow speed, the cooling is already very efficient
- Reversing the coolant flow direction leads to no significant temperature difference for the APV chips
- Both random noise and CMN are stable within the temperature range 25-32 °C.
- The jump in the random noise of RO test is due to the light => we were taking the pictures while running.
- CMN builds up with time for outer sector? → Need to check FST04 with Fermi Lab test stand to verify the module performance.

Summary

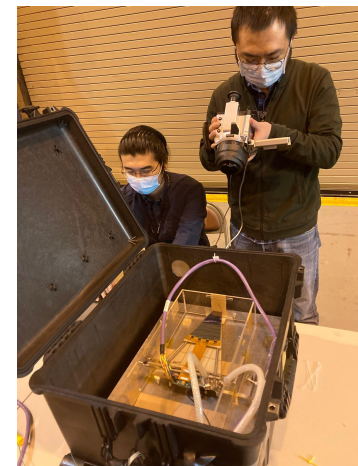
FST DAQ integration test

- Noise vs. HV shows the same structure & noise
- Noise with different trigger rates (10Hz, 100Hz and 1kHz) show the same behavior
- We could control the HV with softioc4, collect the data with the “run control”
 - ⇒ Complete & Success for FST DAQ Integration Test



FST Cooling test:

- The current setup showed with about ~ 1 L/min flow speed, the cooling is already very efficient
- Reversing the coolant flow direction leads to no significant temperature difference for the APV chips
- Both random noise and CMN(Common Mode Noise) are stable within the temperature range 25-32 °C.
- CMN raising with time for outer sector→Need a further check with FST04 @ Fermi Lab test stand



⇒ Complete & Success for FST Cooling Integration Test

Thank you!