

Cold Box Status

Ian Dyckes

On behalf of the LBNL ITk Strip Modules Team



Old

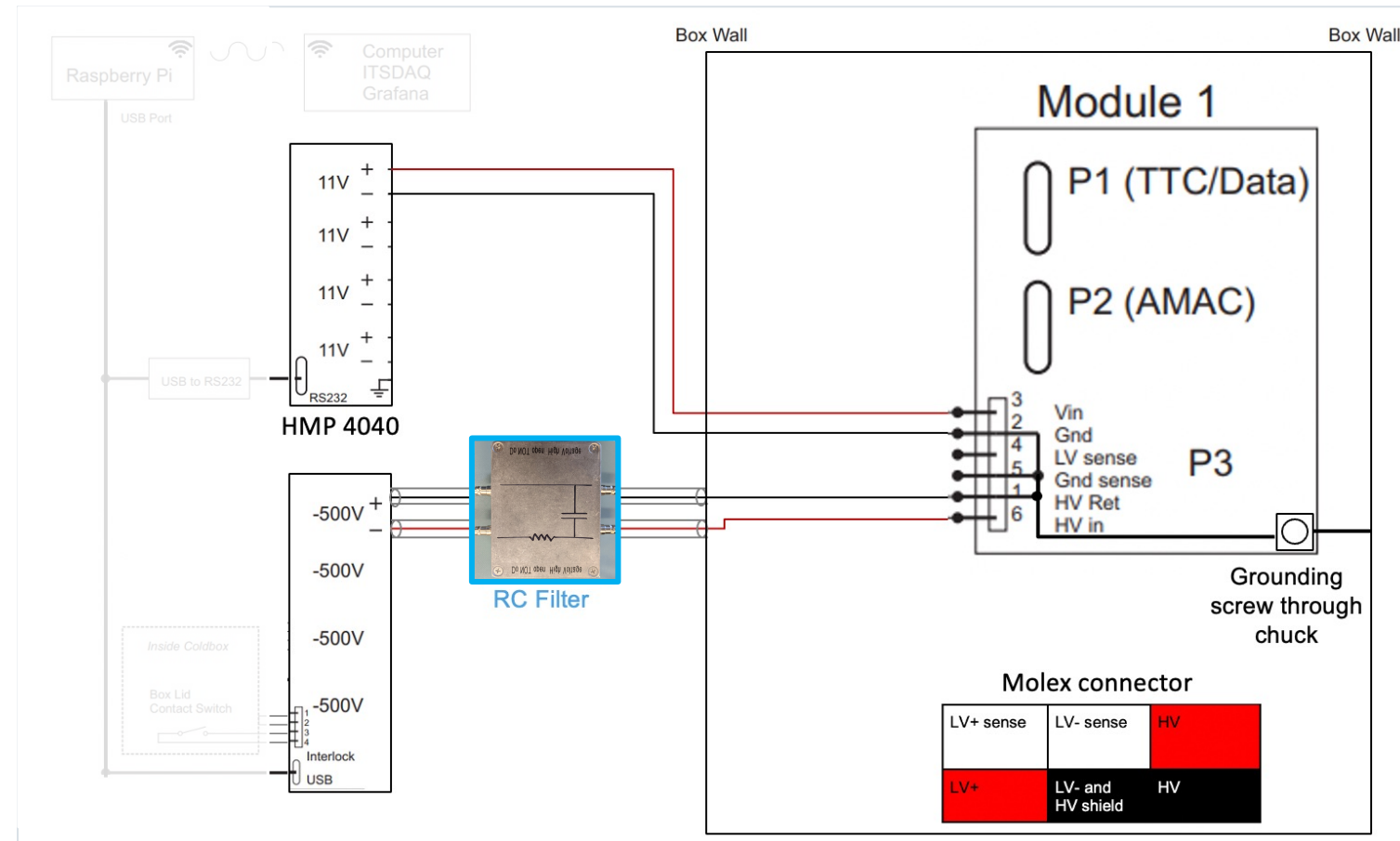
Setup

Hardware:

- Separate SHV cable for HVin and HVret.
 - Modified feed-through and filter box design.
- Ground each module frame to its chuck.
- Ground each chuck to box wall.
- All on one power strip (except chiller).
- Using standard power adapter for RPi & Nexys.
 - No chokes.

Software:

- Only using thermal cycling SW for monitoring:
 - SHT T/RH.
 - Chuck & air NTCs.
 - Dry air flow rate.
 - Dew point.
- Manually controlling chiller and LV PS.
- HV PS controlled from PC over USB.
 - Can control ramp easily.

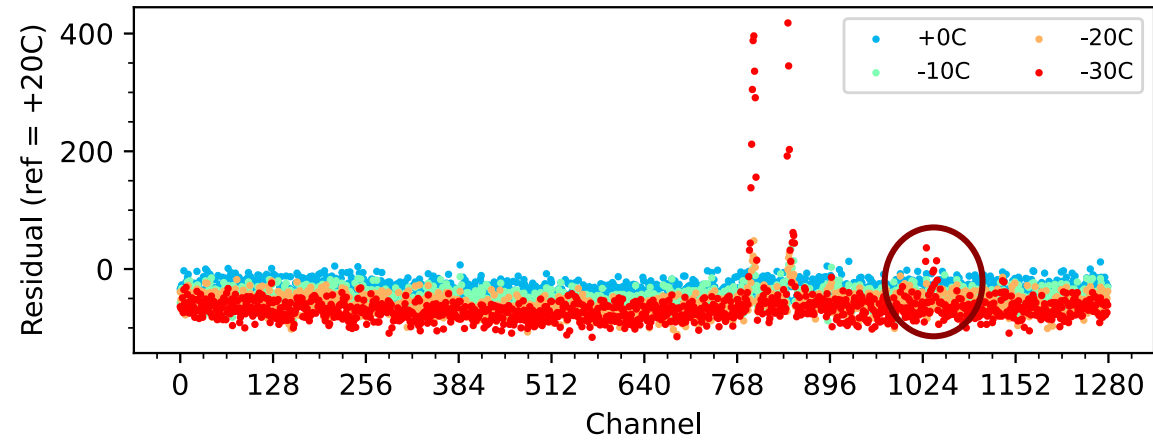
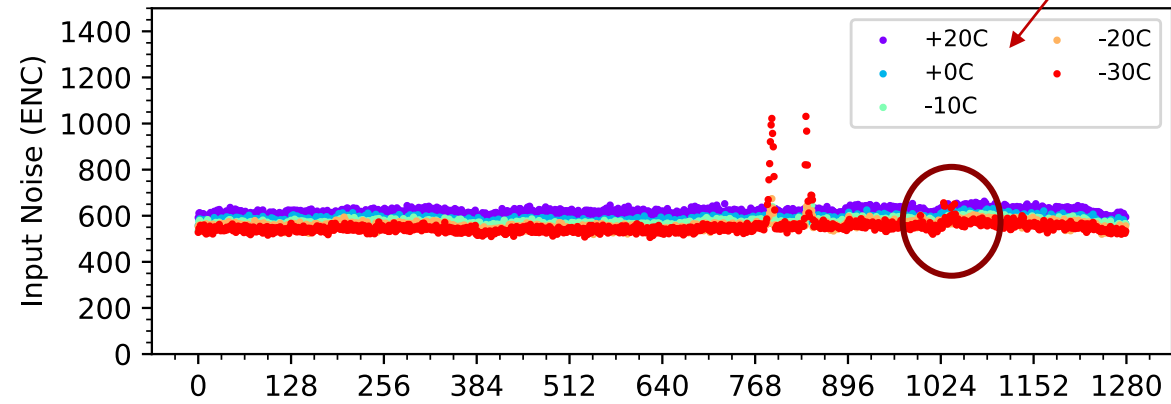


Cold Noise: LBNL_PPA_SS_9

X Hybrid (Under)

Stream 0 Input Noise at 1.50 fC

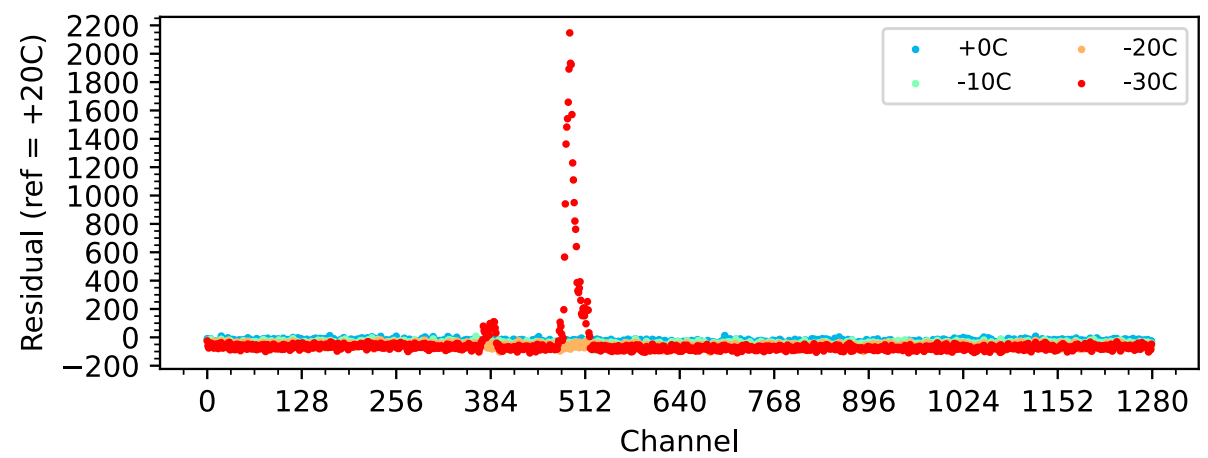
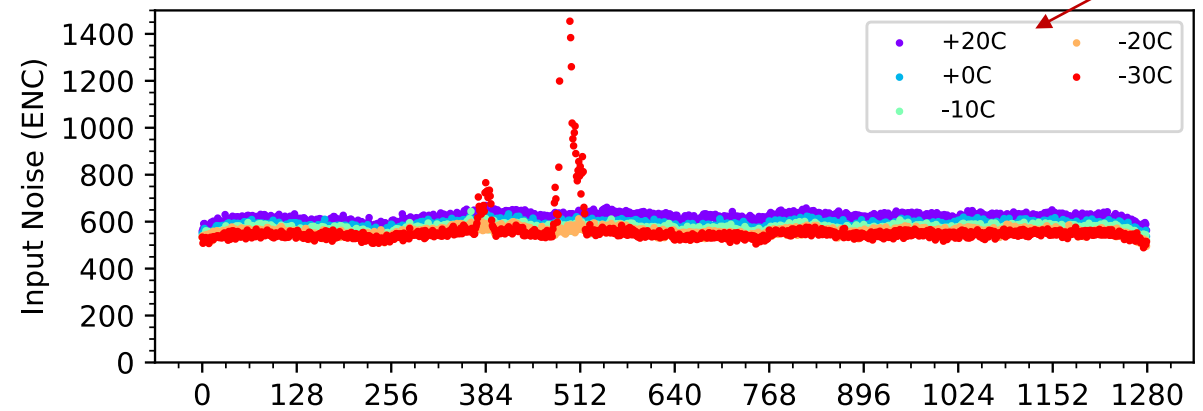
Chiller temps



Y Hybrid (Under)

Stream 0 Input Noise at 1.50 fC

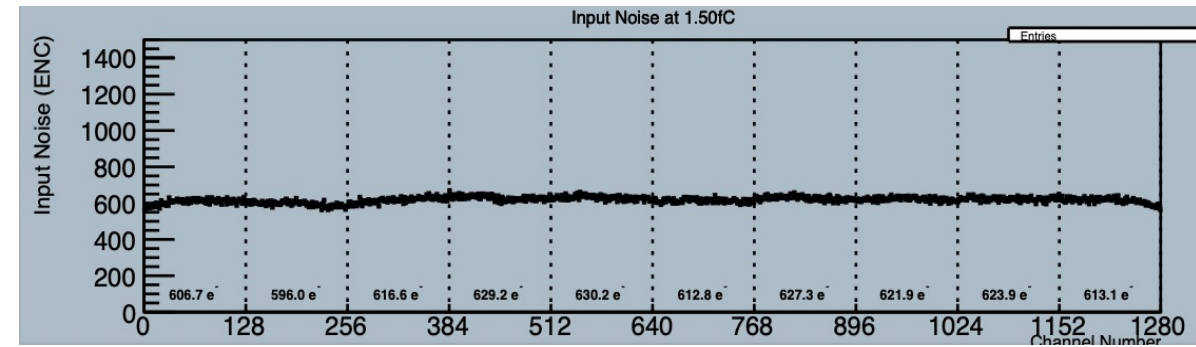
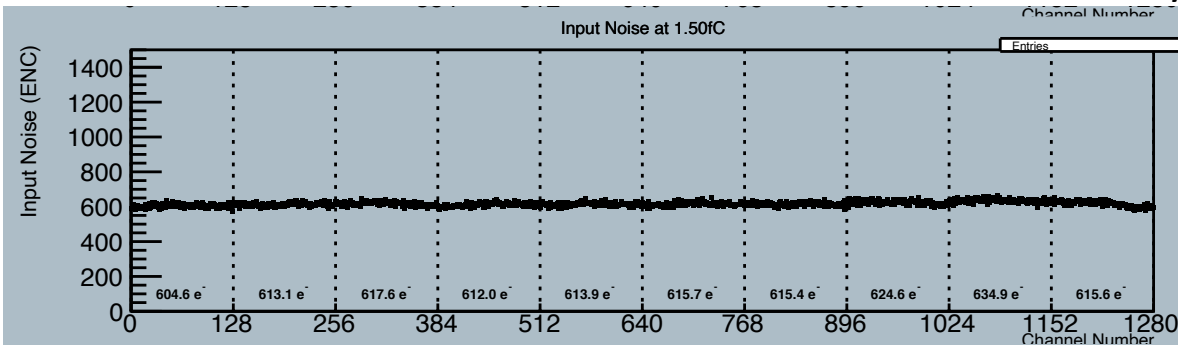
Chiller temps



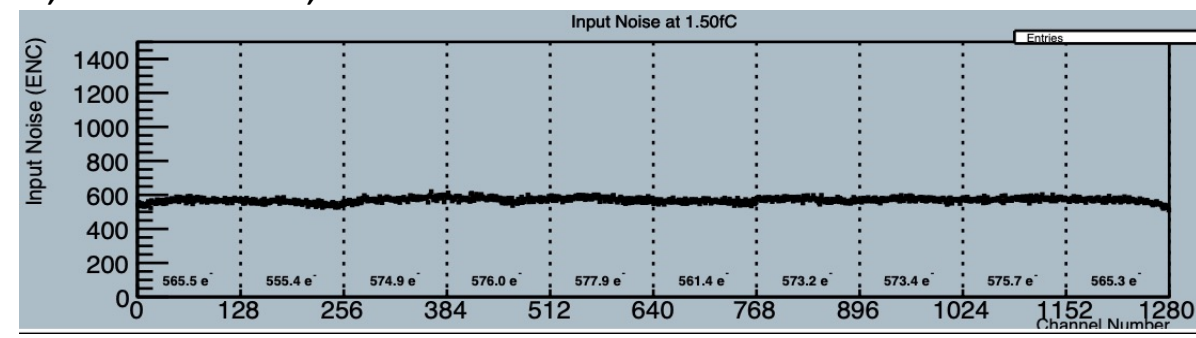
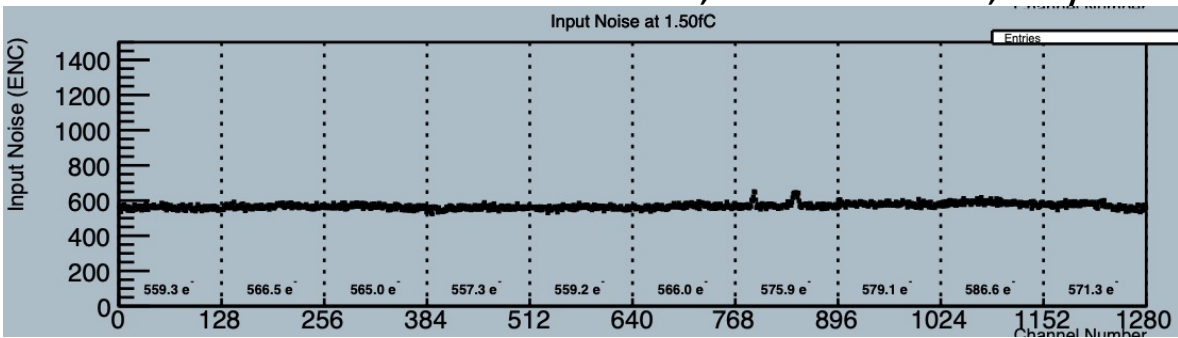
Cold Noise: LBNL_PPA_SS_9

X Hybrid (Under) Y Hybrid (Under)

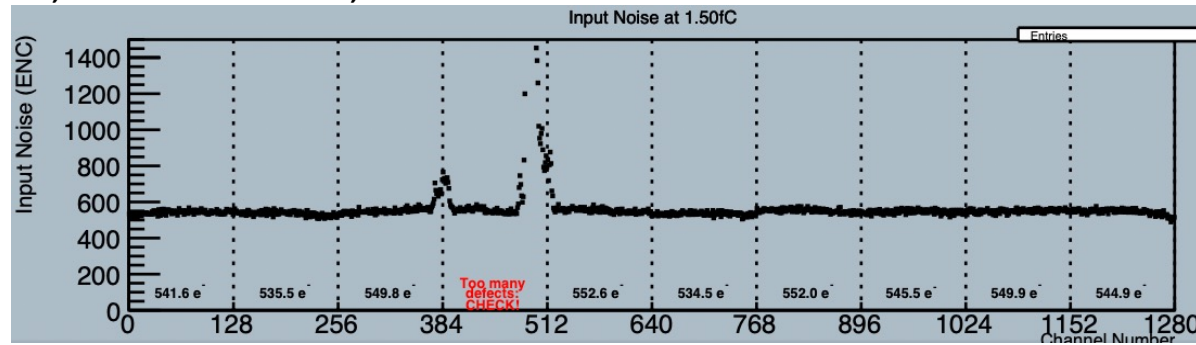
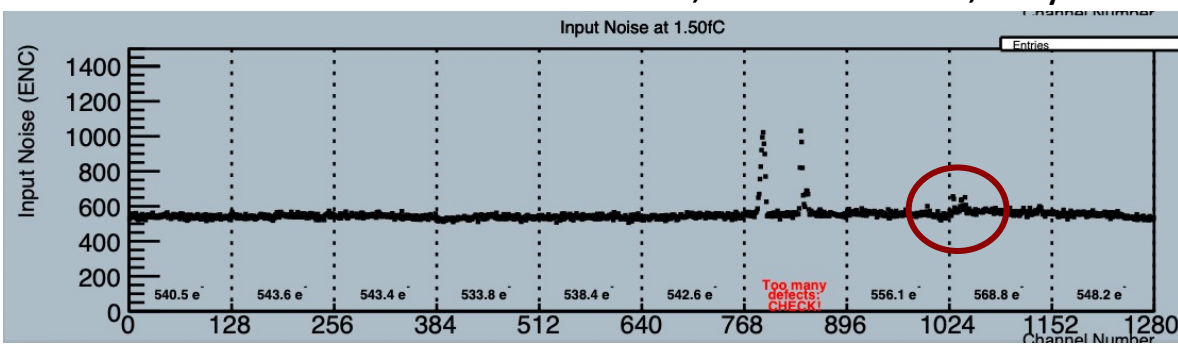
Chiller: 20C, Chuck: 21C, Hybrid NTCs: 21C, PB NTC: 28C



Chiller: -10C, Chuck: -6.5C, Hybrid NTCs: -5C, PB NTC: 3C, Air SHT: 12 C

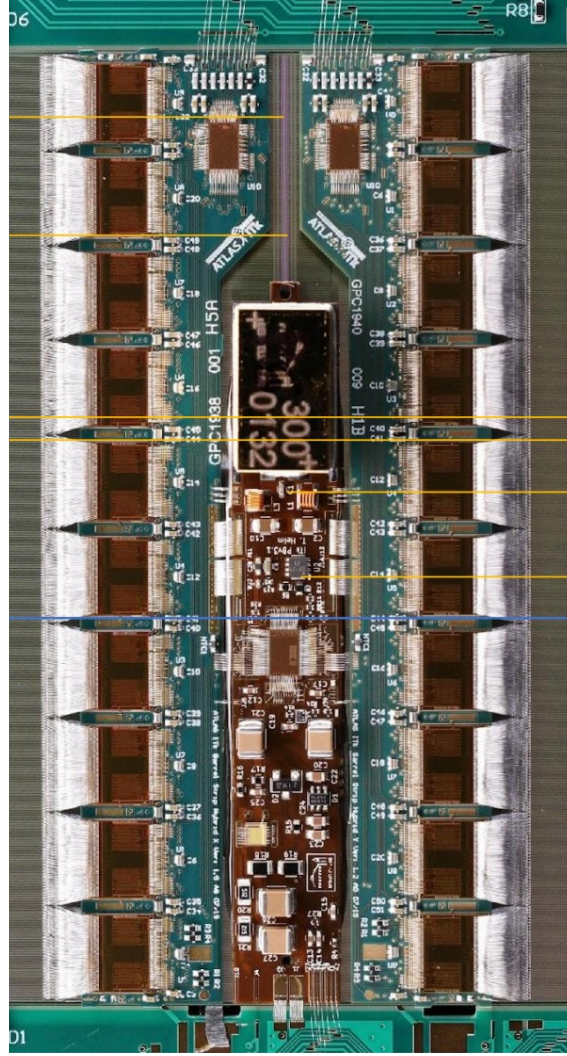
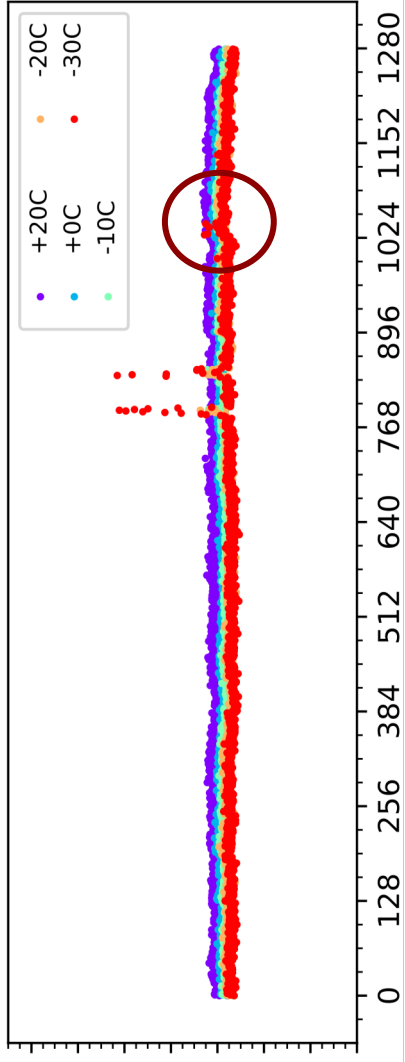


Chiller: -30C, Chuck: -22C, Hybrid NTCs: -19C, PB NTC: -11C, Air SHT: 5C

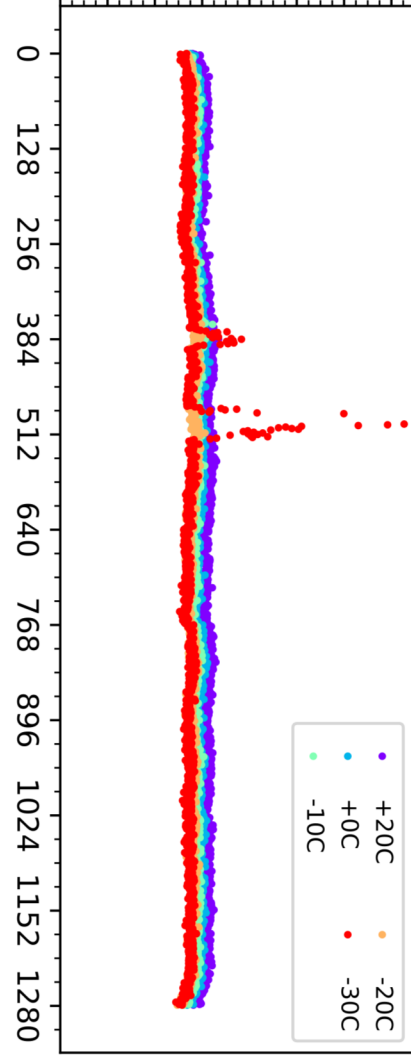


Cold Noise: LBNL_PPA_SS_9

Stream 0 Input Noise at 1.50 fC



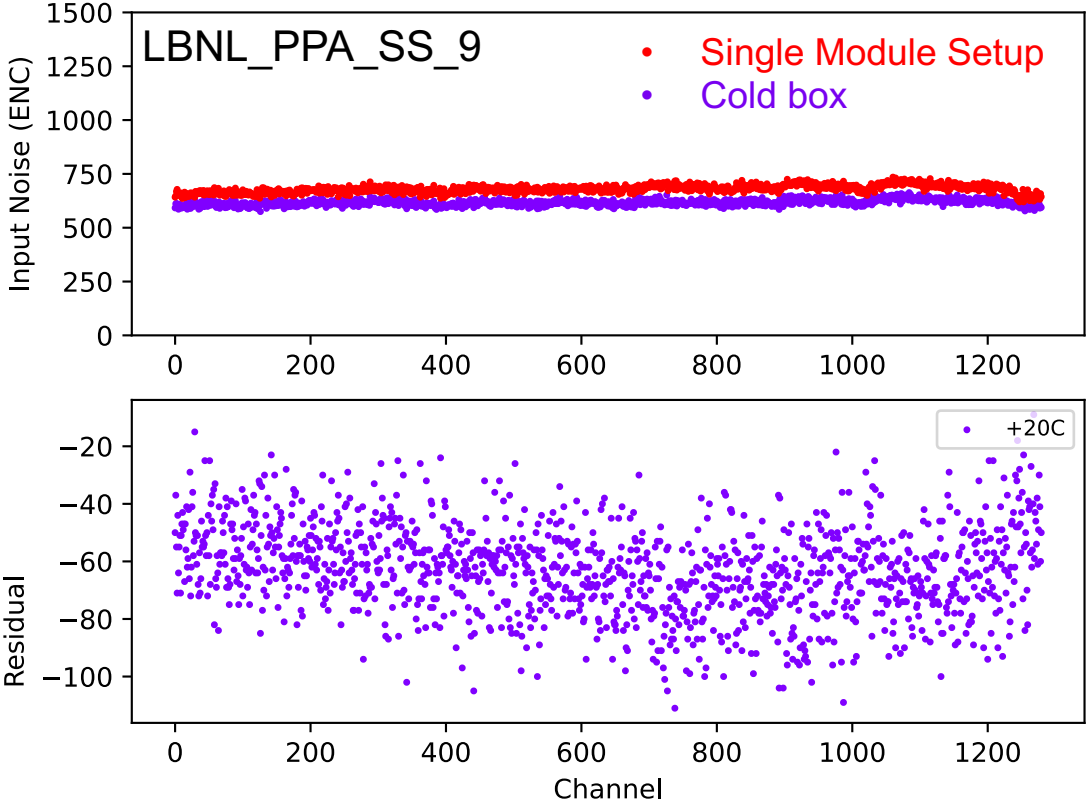
Stream 0 Input Noise at 1.50 fC



Cold Box vs. Single Module Setup

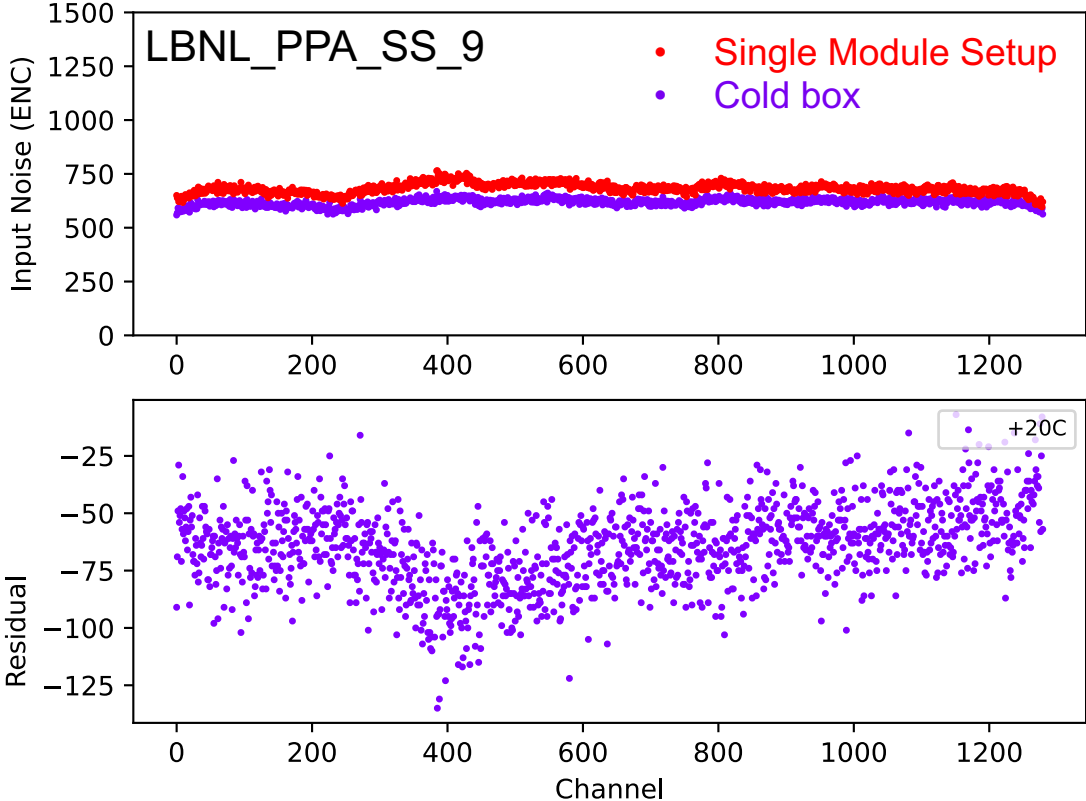
X Hybrid (Under)

Stream 0 Input Noise at 1.50 fC



Y Hybrid (Under)

Stream 0 Input Noise at 1.50 fC



- Chucks @ approx. 20C.

Summary

Summary:

- Tested a single PPA short-strip module down to -30C on the chiller (chuck = -22C).
 - See cold noise on both X and Y hybrids.

Next steps:

- Modify HV feed-through/cabling for remaining chucks.
- Debug some chuck NTC issues and replace the series resistors (100k → 200k).
- Optimize dry air flow.
- Test more modules, particularly:
 - PPB short-strips with 2x the nominal glue weight & height.
 - Prototype modules.
- Finish setting up the SW.
 - Control power supplies and chiller.
 - Interlock.
 - Automation.

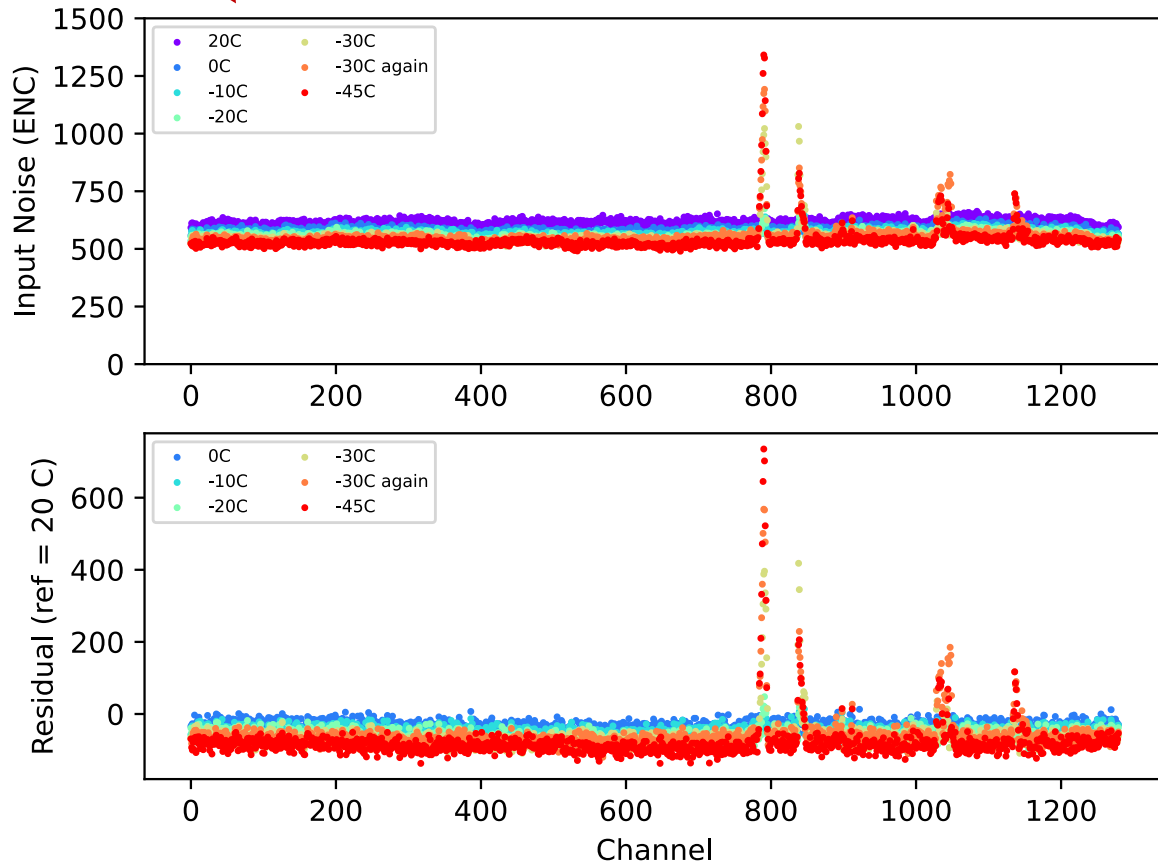
New

Cold Noise: LBNL_PPA_SS_9

X Hybrid (Under)

Stream 0 Input Noise at 1.50 fC

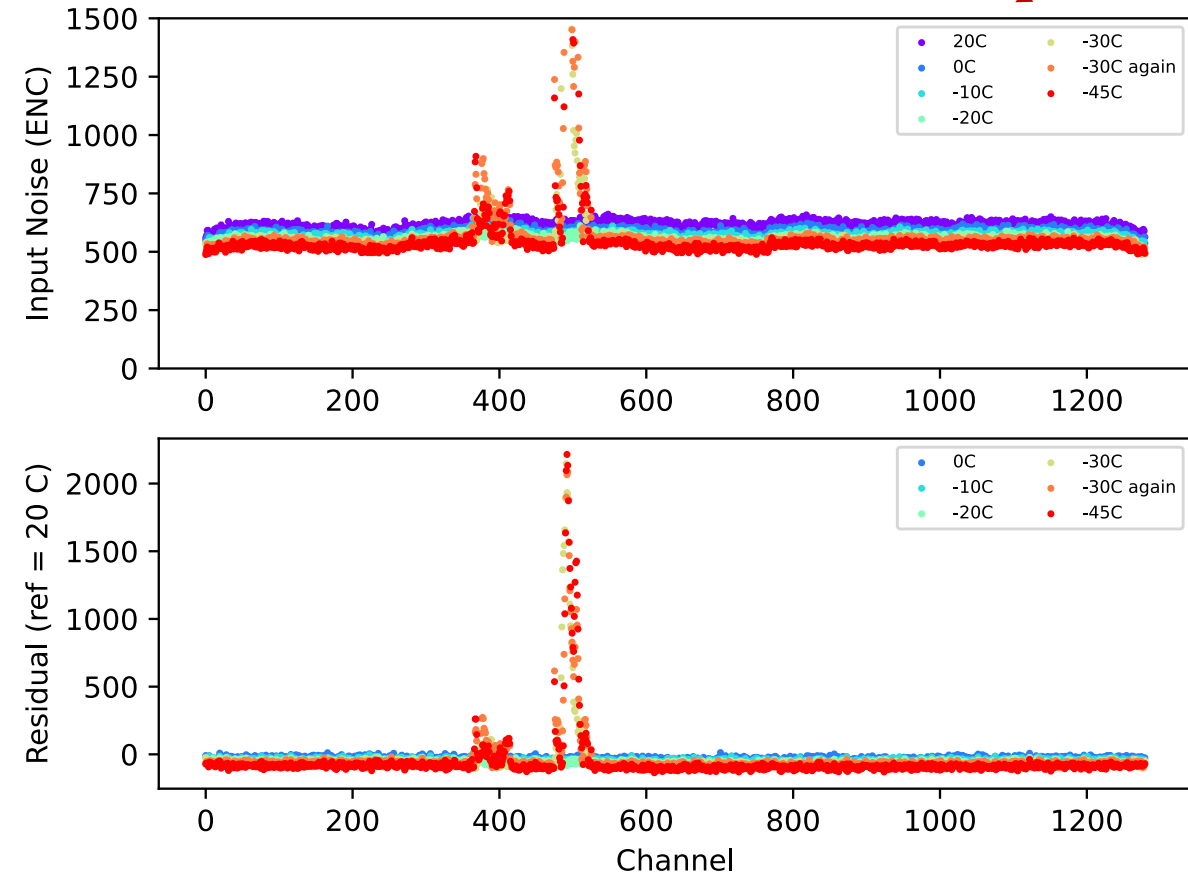
Chiller temps



Y Hybrid (Under)

Stream 0 Input Noise at 1.50 fC

Chiller temps



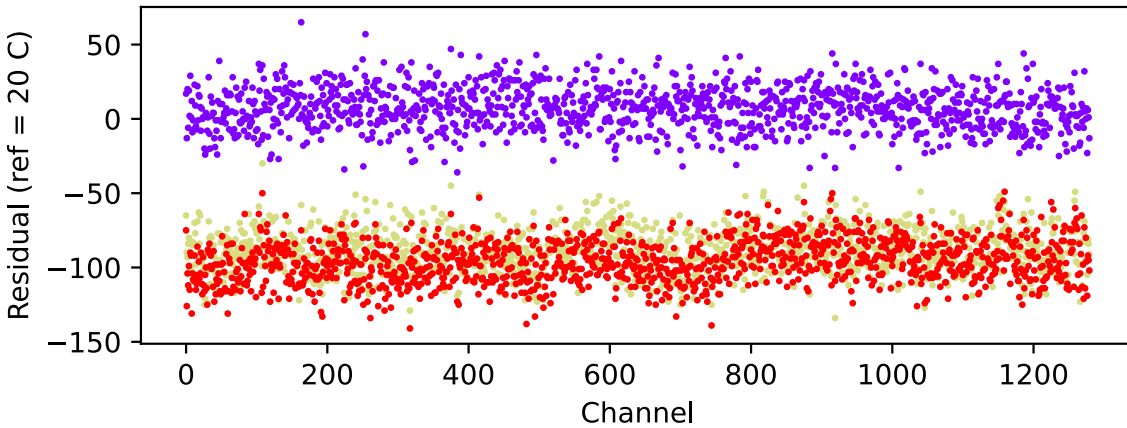
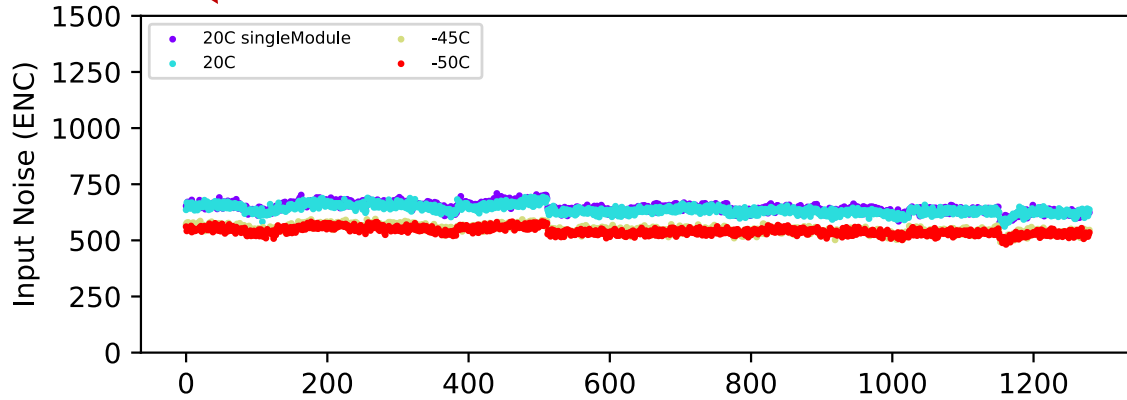
- Tested this module again a few days later -45C for the 1st time (chuck = -35C).
 - Then tested again at -30C (second time).

Cold Noise: LBNL_PPB_SS_21

X Hybrid (Under)

Stream 0 Input Noise at 1.50 fC

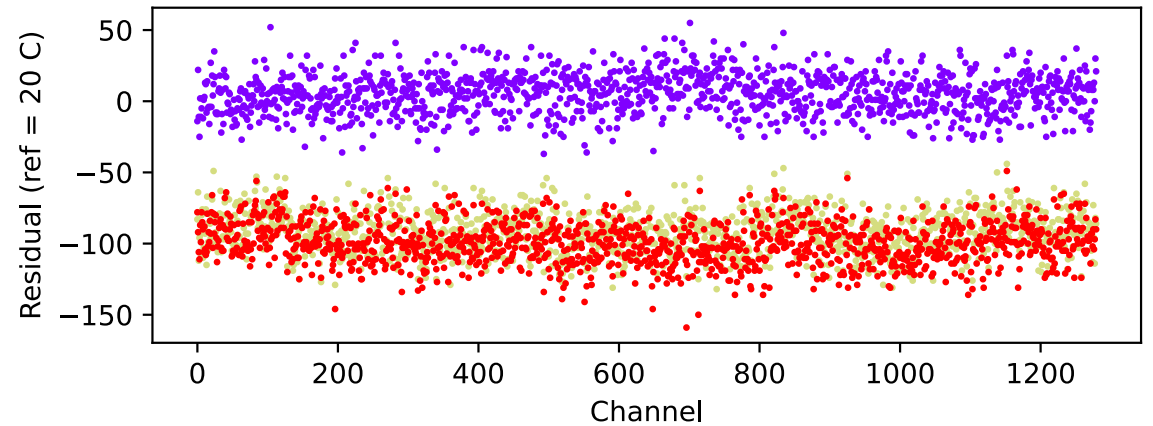
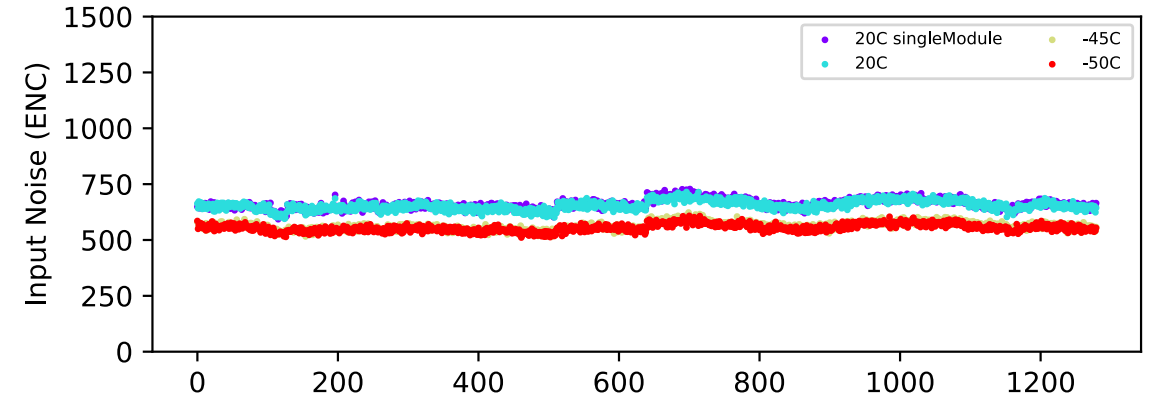
Chiller temps



Y Hybrid (Under)

Stream 0 Input Noise at 1.50 fC

Chiller temps

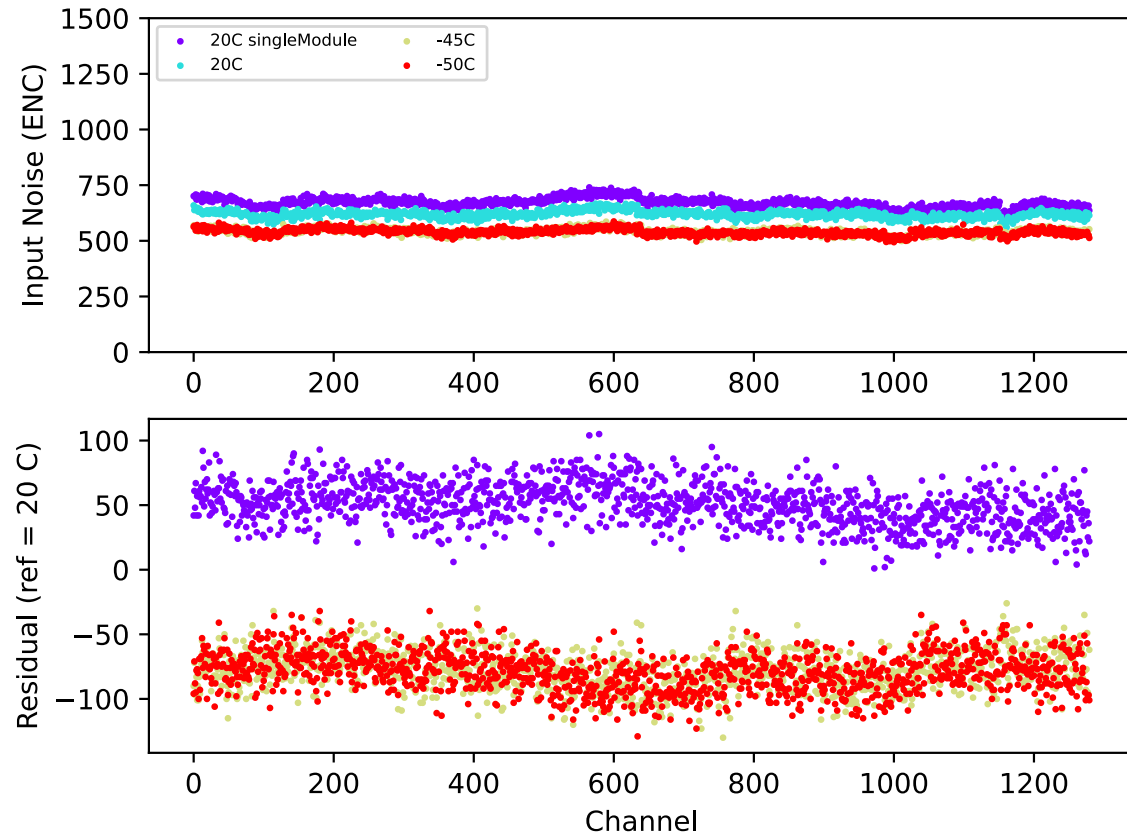


- Module has double glue mass & height.

Cold Noise: LBNL_PPB_SS_23

X Hybrid (Under)

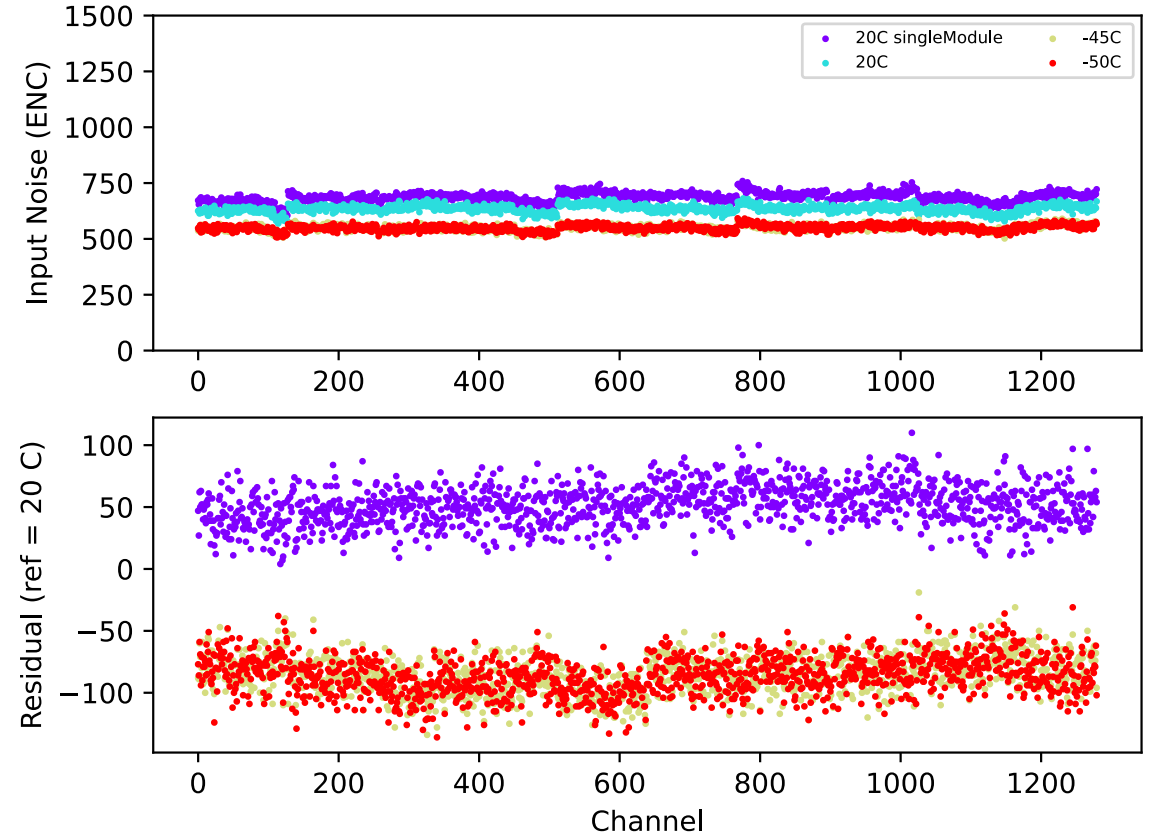
Chiller temps Stream 0 Input Noise at 1.50 fC



Y Hybrid (Under)

Stream 0 Input Noise at 1.50 fC

Chiller temps



- Module has double glue mass & height.

Summary

PPA SS module:

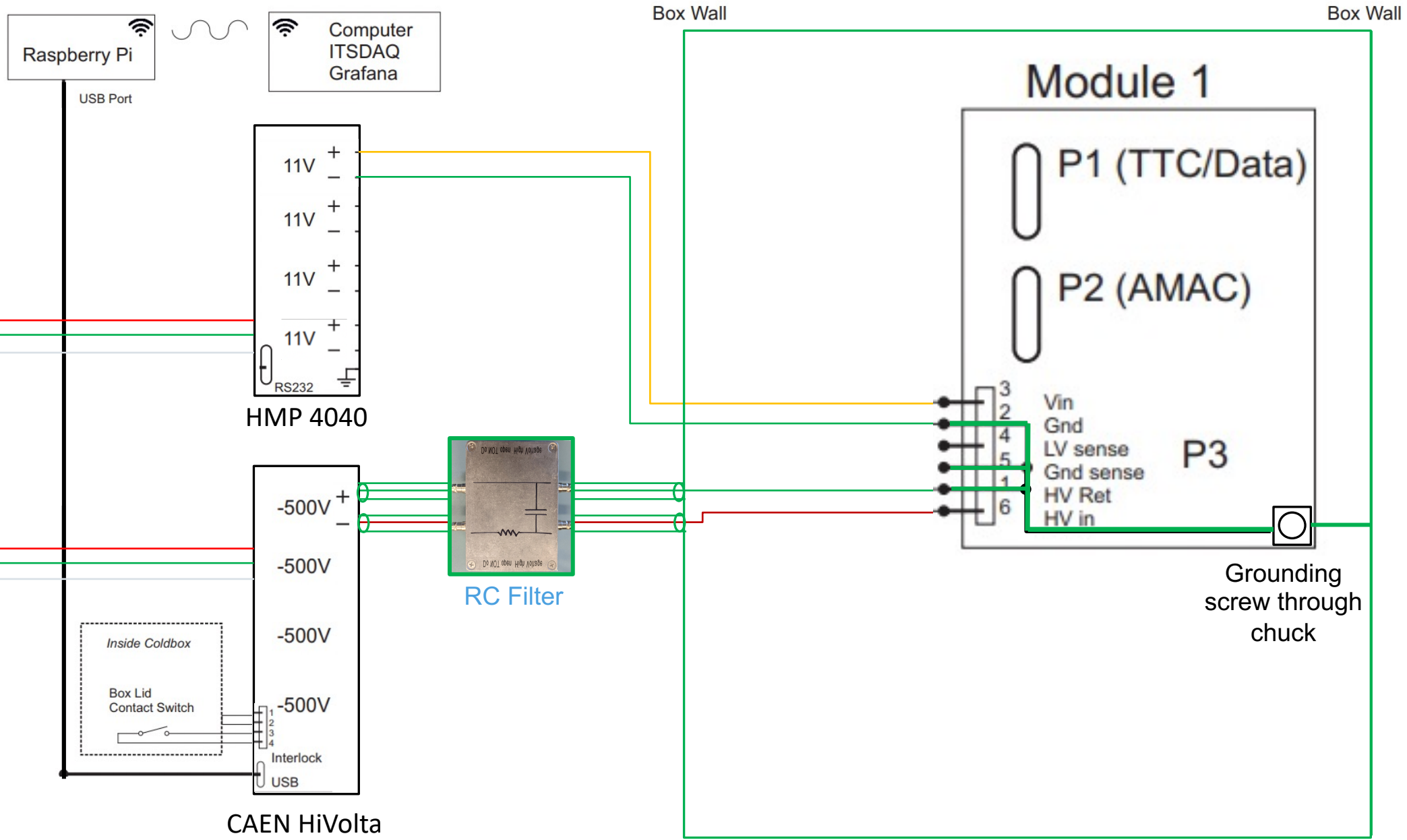
- Originally tested down to -30C on the chiller (chuck = -22C).
 - See cold noise on both X and Y hybrids.
- A few days later, tested this module at -45C on the chiller (chuck = -35C).
- Then tested again at -30C (chuck=-22 C) to compare with original results from last week.
 - Cold noise is worse on the second run.

PPB SS modules with double glue:

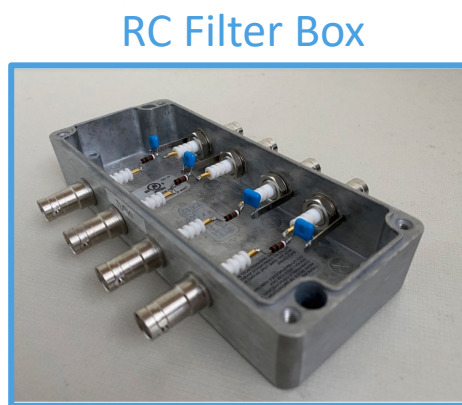
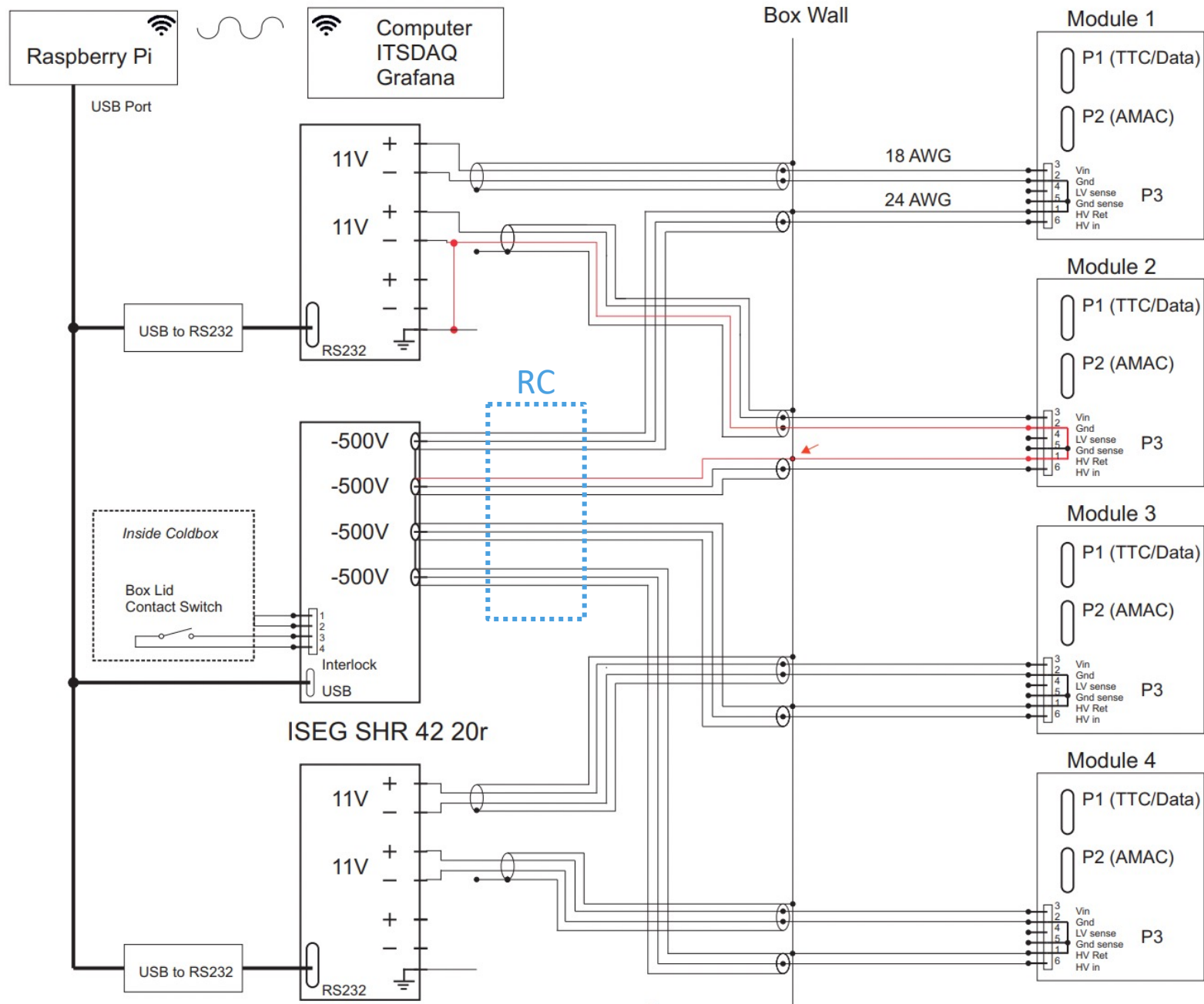
- Tested down to -50C (chuck = -40C).
 - No cold noise.

Backup

LBNL Setup



BNL Setup



Instek PST-3202 32V, 2A supplies 2

Power and HV Interlock

