

DSG NPS Status Meeting Minutes

Date: October 28, 2020

Time: 9:00AM – 9:45AM

Attendees: Peter Bonneau, Aaron Brown, Pablo Campero, George Jacobs, Tyler Lemon, Marc McMullen, Carlos Munoz-Camacho, and Brad Sawatzky

1. Cable Fabrication and Parts Procurement

- 1.1. Mindy Leffel has fabricated 950 HV divider cables so far
- 1.2. All components for 140' multi-conductor cable fabrication ordered

2. CAEN HV Module Testing Status

- 2.1. George Jacobs has completed all voltage stability testing (32 of 34 modules tested)
 - 2.1.1. Plots and analysis summary available on DSG NPS Technical Documentation webpage
- 2.2. George Jacobs has completed current trip testing for 33 of 34 tested
- 2.3. Ramp test planned for all modules to ensure latency issue has been resolved

3. CAEN HV Module Repairs

- 3.1. Current plan is to ship all modules back to CAEN for repairs once module testing is complete
 - 3.1.1. Aaron Brown will contact Greg Kibilko regarding shipping
- 3.2. Experiment will not start until approximately March 2022, therefore modules and crates will not be needed for detector assembly and testing until Spring 2021 at the earliest, according to Brad Sawatzky

4. EPICS CSS-BOY Screens Development

- 4.1. Aaron Brown uploaded updated Channel Assignment spreadsheet to DSG NPS Technical Documentation webpage
- 4.2. Generated list of [CAEN channel parameters](#)
 - 4.2.1. Service name for each crate will be changed before experiment begins, but name not yet chosen
 - 4.2.2. Aaron Brown suggested using *hallcnps1*, *hallcnps2*, and *hallcnps3*
- 4.3. Discussed channel parameters V1Set, I1Set, RDwn, and POn
 - 4.3.1. Brad Sawatzky has no plans to have additional voltage or current limit settings
 - 4.3.2. If a crate loses power for any reason, channels should come back in the OFF state; POn will be set to “Disabled”
 - 4.3.3. If a channel trips, Brad Sawatzky wants the voltage to ramp down according to the set ramp rate; enable “RDwn”
- 4.4. Discussed new numbering scheme (scheme 2), crystal, and PMT numbering
 - 4.4.1. PMTs and crystals will be numbered in same manner (consecutively from 0 to 1079)
 - 4.4.2. PMT position will use scheme 2; channels will go from bottom-to-top (00–35), slots will go from left-to-right (00–29)
- 4.5. Discussed LEDs for NPS Overview screen
 - 4.5.1. Which color should have precedence if multiple faults occur at same time has not been considered; solution may be to make the LEDs blink multiple colors
 - 4.5.2. Aaron Brown will investigate solutions

5. Interlock System Development

- 5.1. Temperature range for NPS experiment is $18^{\circ}\text{C} \pm 0.1^{\circ}\text{C}$
- 5.2. Carlos Munoz-Camacho will provide more information about cooling fans and their potential to have fan speed readout in rpm
- 5.3. Keysight mainframe will potentially be placed with the chillers behind SHMS magnets to provide some radiation shielding
 - 5.3.1. This location is less than 10 m away from detector frame, so may work in regards to the distance limitations for the two-wire thermocouples used in the crystal zone
 - 5.3.2. Additional shielding may be necessary; Brad Sawatzky will look into the viability of this solution
- 5.4. Magnetic field in detector should be 20–50 Gauss according to Carlos Munoz-Camacho; should not negatively affect the magnetic lead of the K-type thermocouple

Issues discussed at the NPS Meeting 10-28-2020

1. How long do we have before these modules and crates must be returned?
 - Experiment will probably not start until March 2022
 - Earliest they would need crates would be Spring 2021 (for staging/testing purposes)
 - Staging/testing would occur in the Test Lab or in the ESB
2. Are we waiting for someone to come to the lab to repair the modules? There is no firm timeline for when visitors will be allowed on-site.
 - We will send crates back to CAEN to repair pin issues
 - Reach out to Greg Kibilko to get the ball rolling on this
3. What would we like the service name for these crates to be? Currently “hvcaentest2” and “hvcaentest3”, maybe hallcnps1, hallcnps2, hallcnps3?
 - No real preference to what the service name for the crate should be.
 - Brad Sawatzky’s main concern was that the service name is able to be changed
4. Are PMTs numbered the same way that the crystals are?
 - Yes
5. Do we want to have two additional voltage and current settings (V1Set and I1Set)?
 - No plans for this at the moment
6. When a trip occurs, should the channels ramp down or “crowbar” down to 0 V?
 - Would like to have the channels ramp down instead of “crowbar” down to 0 V
 - Enable “RDwn”
7. If the crate is power cycled, should the modules come back on with the same “Pw” setting they had before the power cycle?
 - If the crate loses power for any reason, the channels should come back in the “OFF” state.
 - Disable “POn”
8. Which rule should have precedence for LEDs?
 - There are several options. Developing a blinking pattern for LEDs is a possible solution.
9. Should there be an “Acknowledge Warning” button for things that don’t auto-shutdown a module/channel?
 - Plan is to use the Alarm Handler for most things, but maybe an audible alarm for a couple of the screens made by DSG is not a bad idea
 - If we go with audible alarms, then an “Acknowledge” button would be a good idea
10. Do we want an additional temperature warning for module temperatures?
 - Module doesn’t have to turn off automatically due to an “OverTemp” warning
 - Temperature warnings are planned to be taken care of in the Alarm Handler
 - We can do whatever we want with the *Module Temperature* screen
11. Is the temperature range for NPS $18^{\circ}\text{C} \pm 0.5^{\circ}\text{C}$, $18^{\circ}\text{C} \pm 0.1^{\circ}\text{C}$, or something else entirely?
 - Temperature range for the NPS experiment is $18^{\circ}\text{C} \pm 0.1^{\circ}\text{C}$
 - We need to know the minimum precision needed to select temperature/humidity sensors for Hardware Interlock System
12. Do the fans in the detector frame have the ability to output fan speed?

- Carlos Munoz-Camacho is not sure that the fans are able to output speed, but he thinks it probably can
 - Carlos Munoz-Camacho will provide DSG with more documentation about the fans located in the detector frame
13. Carlos Munoz-Camacho is using a Keysight mainframe, terminal block, and multiplexer module; are there spares? Do we want spares?
- Yes, we will need at least one spare for all components
14. Where will the Keysight mainframe be placed in relation to the detector?
- The detector hut (~120 ft from the detector) was the planned location for temperature readout systems, but the thermocouples won't allow for that.
 - Maybe placing the Keysight mainframe with the chillers on the other side of the SHMS magnets (< 10 m away) will be a good solution
15. Is there a good location to place signal conditioners?
- Signal conditioners could also be placed with the chillers
 - May need to build some additional shielding for the Keysight mainframe, chillers, and signal conditioners
 - Need to come up with a CAD model to make sure there's enough room for all of these components as well as for how heavy these items will be.
16. What is the magnetic field in the detector area?
- Carlos Munoz-Camacho says about 20-50 Gauss
17. K-type thermocouples: one of the leads is magnetic (has nickel in it), is this a problem?
- The PMTs are also susceptible to high magnetic fields, so the thermocouple was chosen with this in mind
 - There should be no issues with the magnetic lead according to Carlos Munoz-Camacho
18. Miscellaneous
- For RTDs and thermocouples, maybe make the averaging time longer so that the temperature readout system doesn't have to scan so often
 - This could help with the long cable lengths that might be necessary for the sensors