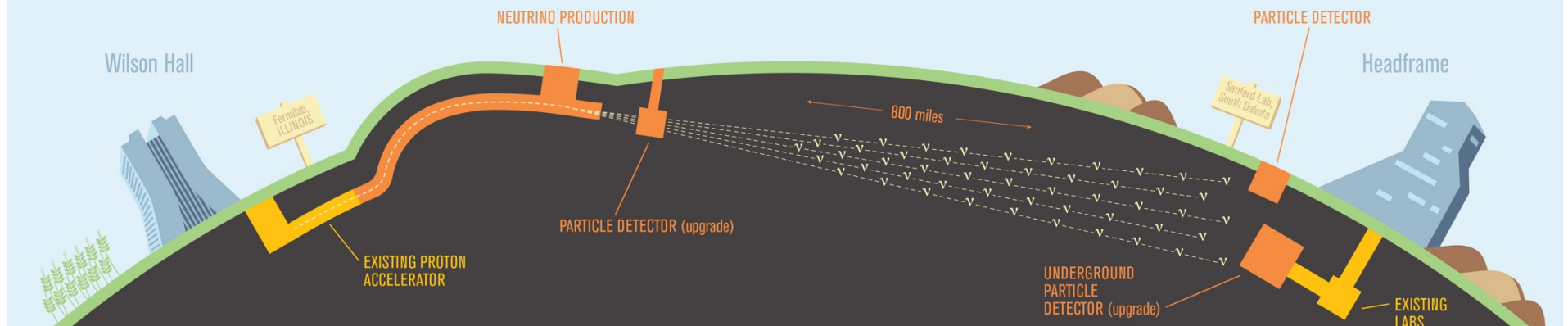


APA consortium

Justin Evans & Brian Rebel

30th September 2024



APA cold tests

APAs 14 and 15 arrived at CERN on Friday morning

These will now be tested in the cold box in the NP04 cleanroom

Pip Hamilton will be leading these activities

- He will run a weekly meeting (available to all on Zoom) to report on the previous week's activities and plan the next week's activities
- He will also hold a daily in-person tool-box meeting each morning to plan the day's activities in EHN1



Planned activities

APA cold-test schedule		
Week beginning	People at CERN	Planned activities
30th September	Pip Hamilton Matthew Wright	DWA testing of both APAs An opportunity to develop the procedure for DWA testing in the process cart with the new APA protection hardware, which we will have to be able to do in the warehouse and then re-wrap
7th October	Pip Hamilton Tom Wieber Matt Brown Alan Wong Hamza Naseer Johann Poirot Roger Huang (9th onwards)	Get both APAs out of the ASF and down into the cold box, onto the rails. Tom and Matt are already experts in APA manipulation. A goal of this week is to get Johann up to expert level, and to begin the training of Pip, Alan and Hamza. The protection panels will still be on the APAs at the end of this week.
14th October	Pip Hamilton Manhong Zhao Anthony Ezeribe Matt Brown Tom Wieber Roger Huang 2x students from the CE group	Install CR boards on both APAs Perform the CR board bias current tests on both APAs Install SHV boards, G-bias boards, CE adaptor boards and cable harnesses on both APAs Install the cold electronics boxes on both APAs Move the first APA into the cold box and connect it up, ready for cool-down and testing the following Monday

Planned activities

- The first APA will be cooled down on Monday 21st October and tested that week
- Until recently we thought the argon transfer from NP04 to NP02 would start this week, hence we would lose access, however this argon transfer has now been delayed
- We now therefore have to plan activities for the weeks of 21st and 28th October, as well as assemble effort at CERN for these activities

APA cold-box expectations

- **Before closing the coldbox:**
 - Confirm with checkout pulser runs (high baseline, DAC=0x10 and low baseline, DAC=0x20) that all electronics channels are responsive
 - Confirm with a noise run that there are no open or shorted channels beyond those documented in the non-conformity report for the APA
- **After closing the coldbox:** repeat the above tests and confirm no change. General noise levels should be below ~2000 electrons ENC
- **During both coldbox cooldown and warmup:** monitor the noise response at a O(0.1 Hz) rate.
- **After cooldown is complete:**
 - Confirm with the same pulser runs that **100% of electronics channels remain responsive**
 - Collect a noise run and record any open or shorted channels. Besides documented non-conformities, any additional channels showing anomalous behavior at cold should be **no more than 0.5% of total channels**
 - General noise levels should be < **1000 electronics ENC**
- **While the APA is cold:** apply full wire bias to the APA (+820 / -370 / -665 V for the X / U / G layers)
 - Verify that leakage current is negligible at full bias
 - Confirm with an electronics noise run that the behavior is different with bias on vs off. This is expected to manifest as a low-frequency vibration, whose magnitude should be small but can be captured with a large continuous readout window (~200 ms)
- **After coldbox warmup:** confirm that any anomalous channels that newly appeared at cold have returned to normal. Behavior of all channels should be the same as before the cooldown.

➤ This slide from Roger Huang at the Santa Fe meeting nicely sets out our expectations

Updating procedures

These cold tests are an important opportunity for us to develop and refine our procedures

- In particular, we are now working with new APA protection hardware

We must photograph and document all activities, and record all issues that arise

We will use this experience to update all our procedures with a view towards both future cold tests and to installation at SURF

PCBs

William & Mary will imminently ship the U and G wrap boards to Chicago for US APA 1

- This will complete the board delivery for APA 1

Chicago already have head boards available through to APA 5

We are shipping one full set of wrap from Daresbury to Chicago to ensure that Chicago can work uninterrupted through the completion of APAs 1 and 4

- Daresbury have around 10 APAs's worth of boards in stock, hence this is not an issue

William & Mary will then provide 1 APA's worth of wrap boards every month

- APA 5 by 1st Nov, APA 6 by 1st Dec, etc

The UK will wrap boards for **all** US APAs (through to 14) to W&M by the end of this year

- Prioritising the delivery of 026, 028, 040 and 042 boards, which will keep W&M running through the end of the year

All laser-etched cover boards for all US APAs (up to 14) will be delivered to Chicago (from Lancaster) by 10th October

It is vital that we inventory the boards at each site and ensure the database correctly reflects this inventory

- All sites must record all shipments sent and received
- All sites must use the Geometry Board Rejection form in the database if a geometry board is rejected and scrapped