DUNE Project Status

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DUNE PMG Meeting

18 September 2018

Outline

- ES&H Update
- QA Update
- Schedule & Budget Status
- PM Update
- DUNE Update
  - FD Engineering
  - FD Installation
  - FD TPC Electronics
  - FD APA
- ProtoDUNE Onsite Report
- Upcoming Events

ES&H Update

- LBNF/DUNE ESH Introduction video is complete
  - Video will be shown as part of the SURF site ESH orientation training
- Meeting with LBNF Cryogenic Safety Committee chairs to discuss to discuss DUNE detector filling process
  - Personnel access to the 4950L
- Participate in the LBNF/DUNE Interface Meeting at CERN
  - Site tour to observe ProtoDUNE detector filling operations
- Supporting the development of the DUNE design review process
  - Supported DUNE Detector Support System conceptual design review & interface meetings at CERN

Quality Assurance

- DUNE Detector Support System (DSS)
  - Participated remotely in the review of the DUNE Detector Support System (DSS) conceptual design (30% design)

- DUNE Quality Assurance Specialist
  - Position description has been developed and a job has been posted for the QA Specialist to assist the Consortia in the development of QA/QC procedures and plans.

DUNE Milestones

Filling complete 13 Sept, 1am (CERN time)

	August 2018 P6 Update	July 2018 P6 Update	Variance	Comments
Completed In August				
DUNE				
T4 MS - ProtoDUNE SP Approval for Filling Completed	8/15/2018	8/15/2018	-	
Planned for Completion Sept-Nov				
DUNE				
T4 MS - Stakeholders Written Approval of 30% FSCF Final Design Documents	9/1/2018	8/14/2018	(18)	More time needed to review design documents
T4 MS - ProtoDUNE SP Cooldown and Filling Completed	9/12/2018	9/24/2018	12	Original schedule for filling was over-estimated
T4 MS - ProtoDUNE SP Detector ready for operations	10/10/2018	10/22/2018	12	Original schedule for filling was over-estimated
T4 MS - ProtoDUNE Start Operations	10/11/2018	10/23/2018	12	Original schedule for filling was over-estimated
T4 MS - Stakeholders Written Approval of 60% FSCF Final Design Documents	10/29/2018	11/2/2018	4	
T4 MS - Interface Agreement with all Detector Subgroups Complete	11/14/2018	11/26/2018	12	Original schedule for filling was over-estimated

DUNE Stop Light Report for Current Month

August 31, 2018							
Currency in: $K	Current Period						
rk Package.WBS (2), Work Package.WBS (3), Work Package.WBS	Budget	Earned	Actuals	SV ($)	SV (%)	CV ($)	CV (%)
131.02 DUNE	2,003	1,736	2,215	(267)	-13%	(480)	-28%
131.02.01 Project Office - DUNE	1,157	1,157	1,128	0	0%	29	3%
131.02.02 Far Detector	846	579	1,087	(267)	-32%	(509)	-88%
131.02.02.20 Far Detector - Detectors 1-4	790	526	947	(264)	-33%	(421)	-80%
131.02.02.30 ProtoDUNE Design and Construction	0	0	176	0	0%	(176)	-
131.02.02.40 ProtoDUNE Onsite	56	52	(36)	(3)	-6%	89	169%
131.02.03 Near Detector	0	0	0	0	0%	0	0%
Total	**2,003**	**1,736**	**2,215**	**(267)**	**-13%**	**(480)**	**-28%**

- Still unraveling lingering costs on ProtoDUNE Design & Construction

DUNE Stop Light Report – Cumulative

August 31, 2018									
Currency in: $K	Cumulative to Date								
rk Package.WBS (2), Work Package.WBS (3), Work Package.WBS	Budget	Earned	Actuals	SV ($)	SV (%)	CV ($)	CV (%)	SPI	CPI
131.02 DUNE	36,576	36,303	43,411	(273)	-1%	(7,107)	-20%	0.99	0.84
131.02.01 Project Office - DUNE	6,407	6,407	6,139	0	0%	268	4%	1.00	1.04
131.02.02 Far Detector	30,170	29,897	37,272	(273)	-1%	(7,375)	-25%	0.99	0.80
131.02.02.20 Far Detector - Detectors 1-4	8,629	8,395	7,650	(234)	-3%	745	9%	0.97	1.10
131.02.02.30 ProtoDUNE Design and Construction	18,482	18,482	26,206	0	0%	(7,724)	-42%	1.00	0.71
131.02.02.40 ProtoDUNE Onsite	3,059	3,020	3,417	(39)	-1%	(396)	-13%	0.99	0.88
131.02.03 Near Detector	0	0	0	0	0%	(0)	-	-	0.00
Total	**36,576**	**36,303**	**43,411**	**(273)**	**-1%**	**(7,107)**	**-20%**	**0.99**	**0.84**

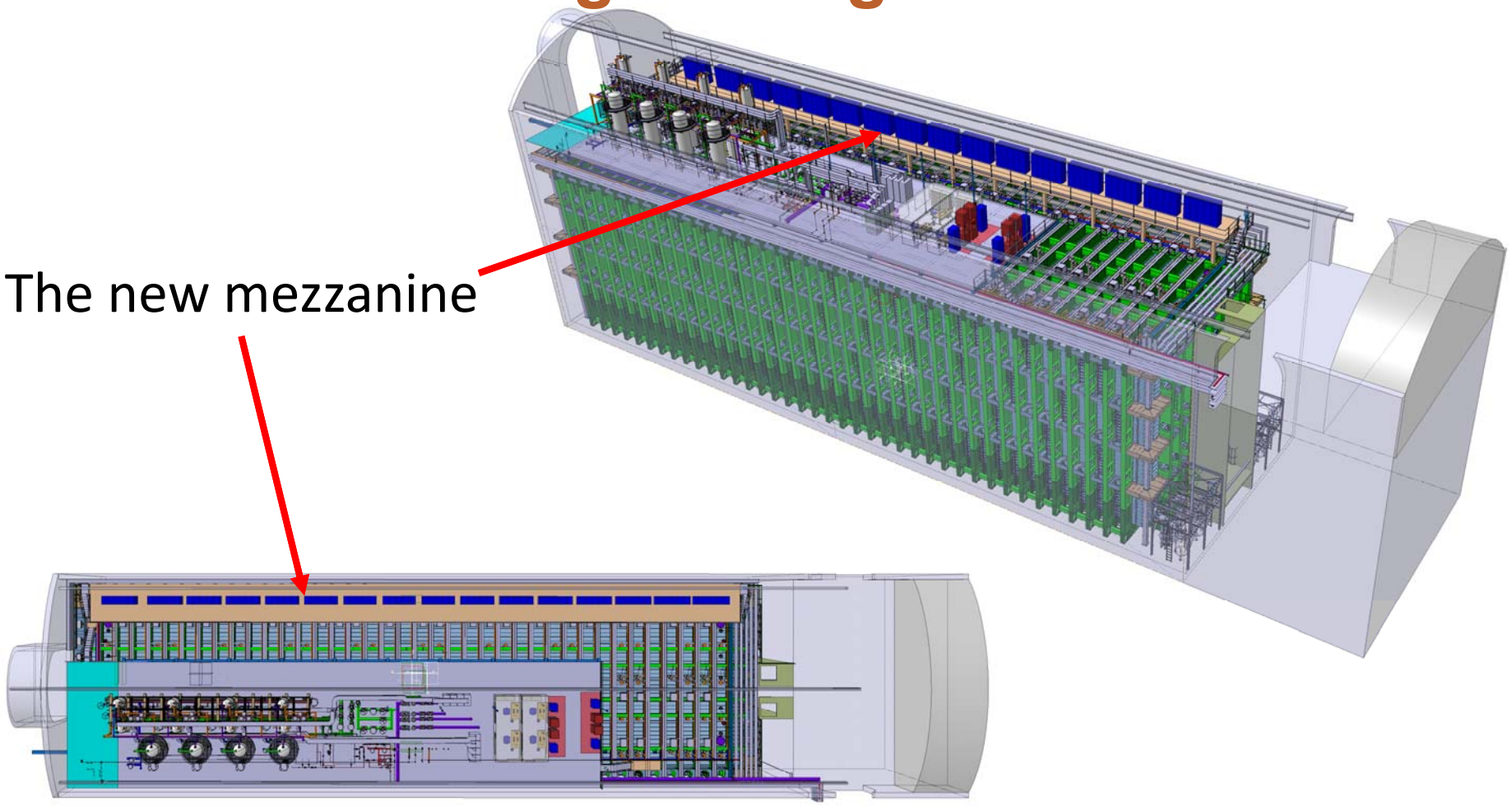
Project Management Highlights

- Completed the comprehensive bottoms-up cost/schedule estimate
  - FY19 DUNE-US Project Office includes DUNE Technical Coordination until distinct funding source is confirmed
  - DUNE-US also includes:
    - Support of various consortia R&D and production: SP Photon Detector, Cryogenic Instrumentation & Slow Controls, DAQ, HV
    - Nominal support of Near Detector Installation
  - DUNE International schedule integrated with LBNF/DUNE-US P6 schedule
- Actions for October cost/schedule review moving forward
  - BCRs in process for the DUNE-US re-estimate
  - Draft charge & agenda prepared
  - Update documentation including Project Management Plan & Project Assumptions
- Significant outcome of August LBNF/DUNE integration meeting was action to resolve stored energy issue associated with filling of detector #1 concurrent with installation of detector #2
- Many requisitions initiated for FY19 SOWs

Far Detector Engineering

- Detector component integration and installation
  - Conducted conceptual design review for SP detector support system, submitted review report and recommendations
  - Developed conceptual design review charge for SP photon detector and integration test facility
  - Developed preliminary design review charges for anode panel assembly
  - Presented plans for rack cooling and cavern bridge at integration meeting at CERN
  - Reviewed and provided comments to Arup on conceptual design of cavern bridge and assembly cranes
  - Finalized requirements for integration test facility cold test boxes
  - Worked with APA engineering & APA consortia to develop plan for structural analysis of APA
- DUNE Detector electronics and grounding
  - Reviewed the ARUP EXC and 30% BSI Document Releases and provided feedback on the infrastructure grounding and details which need to be better defined moving forward.
  - Participated in meeting with CD Core Computing groups to discuss networking between Fermilab and SURF. Began initial discussions related to specific requirements which DUNE will have at SURF. Bi-weekly meetings will be held to continue discussions.
  - Participated in an Integration Meeting at CERN August 22-23. One of the items discussed was the possibility of a new mezzanine which would house the majority of the electronics readout and CISC racks required for DUNE (not the DAQ racks). This concept is now being studied.

Far Detector Engineering



Detector Support Structure DSS 30% Design Review

- DUNE DSS CDR took place August 20-21 at CERN
  - Review Indico Page
  - Revew Charge
  - Review Committee
    - Steve Kettell (chair), Farshid Feyzi, Olga Beltramello, Dan Wenman, Dmitar Mladenov, Peter Sutcliffe, Marzio Nessi, Mike Andrews, Kevin Fahey, Terri Shaw, Jack Fowler, Diamanto Smargianaki, Bill Miller, Eric James (ex-officio)

  - Requirements, DSS design, Engineering Analysis, Interfaces, Quality Assurance, Installation, and Cost.

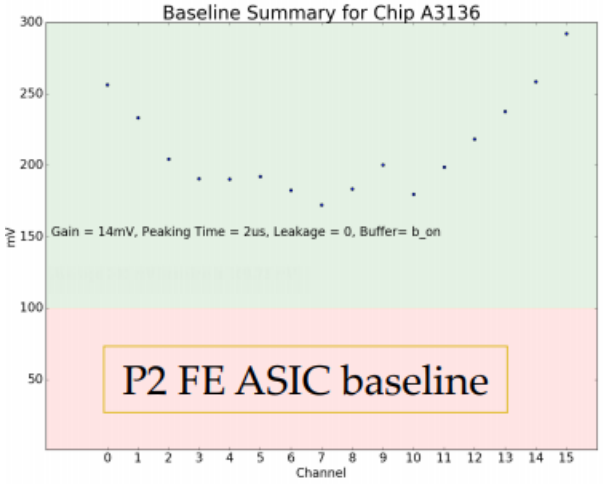
- Several suggestions for design improvement
- In general it was felt that what was presented met the requirements for a 30% design.

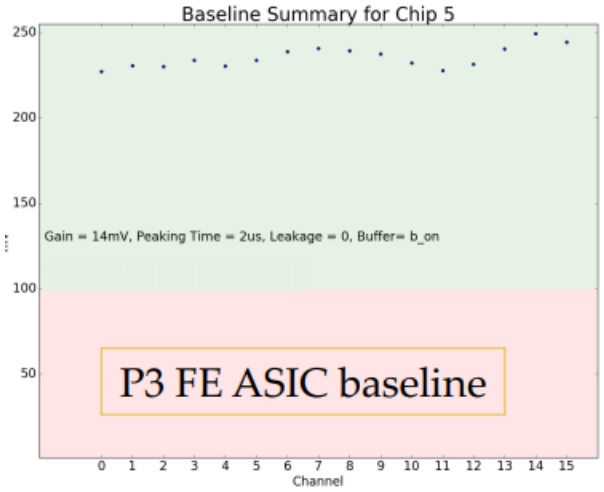
Installation

- During LBNF/DUNE Interface meeting, 21-23 August, safety concerns were raised related to working near the cryostat during filling.
  - The concern is related to pressure and stored energy from the gas in the vessel.
  - This is being evaluated by FNAL safety and LBNF Cryogenics Safety Committee
  - The installation process could be significantly impacted by this so work is paused on installation planning while the evaluation is ongoing.

Cold Electronics – ASIC Submissions

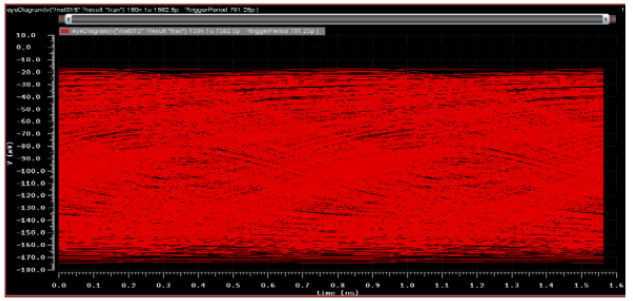
- LArASIC v8 (Front-End ASIC)
  - First 240 chips received at BNL at the end of August
  - Tests ongoing, all the design changes implemented in this version are working properly (address problem of non-uniform baseline, new default setting for gain)
- New Cold ADC
  - Running full chip simulation and fixing minor mistakes in the design
  - Discussing the scope of mixed-mode simulations and how many to perform prior to October submission
  - First internal full layout of the chip available at the end of this week, but we still need a visit to Fermilab from a BNL engineer to address a few remaining issues on their part of the design (cannot be done at BNL due to differences in the design kit used).

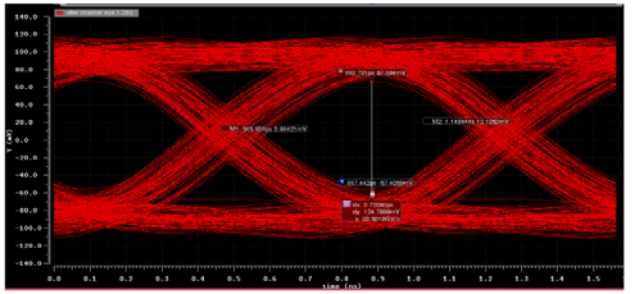




Cold Electronics – ASIC Submissions (i)

- COLDATA
  - Design of line driver with pre-emphasis progressing at SMU, results for 1.28 Gbit/s transmission (this will be included in November prototype) are promising
  - Timeline for November submission is getting tight (main FNAL digital engineer was supposed to transition from ColdADC to COLDATA, may need another 2-3 weeks)

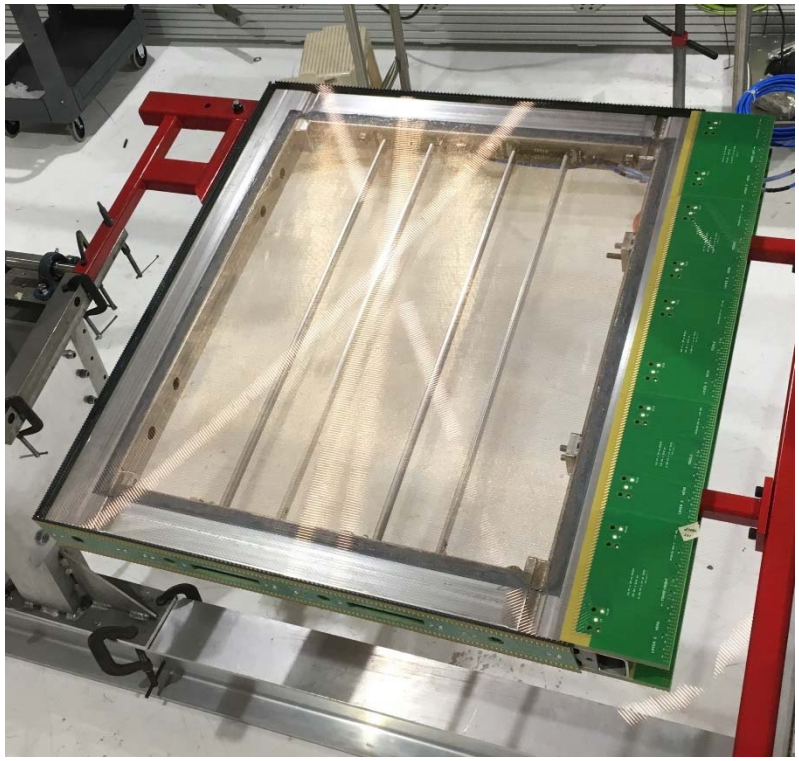




- SLAC CRYO
  - Work on CRYO for DUNE put on hold at SLAC, higher priority given to other developments (SLAC is short of ASIC engineers, like other national labs)
  - Submission now likely postponed to November
- System Tests
  - Delays in ASIC submissions are reducing the time available for the completion of system tests prior to the CD-2/3b review in Fall 2019

Cold Electronics – Small TPC Construction

- Steady progress according to schedule
  - Expecting APA at Fermilab in early October
  - Expecting cryostat at Fermilab toward the end of October
  - DAQ commissioning progressing at Fermilab
  - Will be fully commissioned with protoDUNE electronics by year's end



Cold Electronics – Schedule

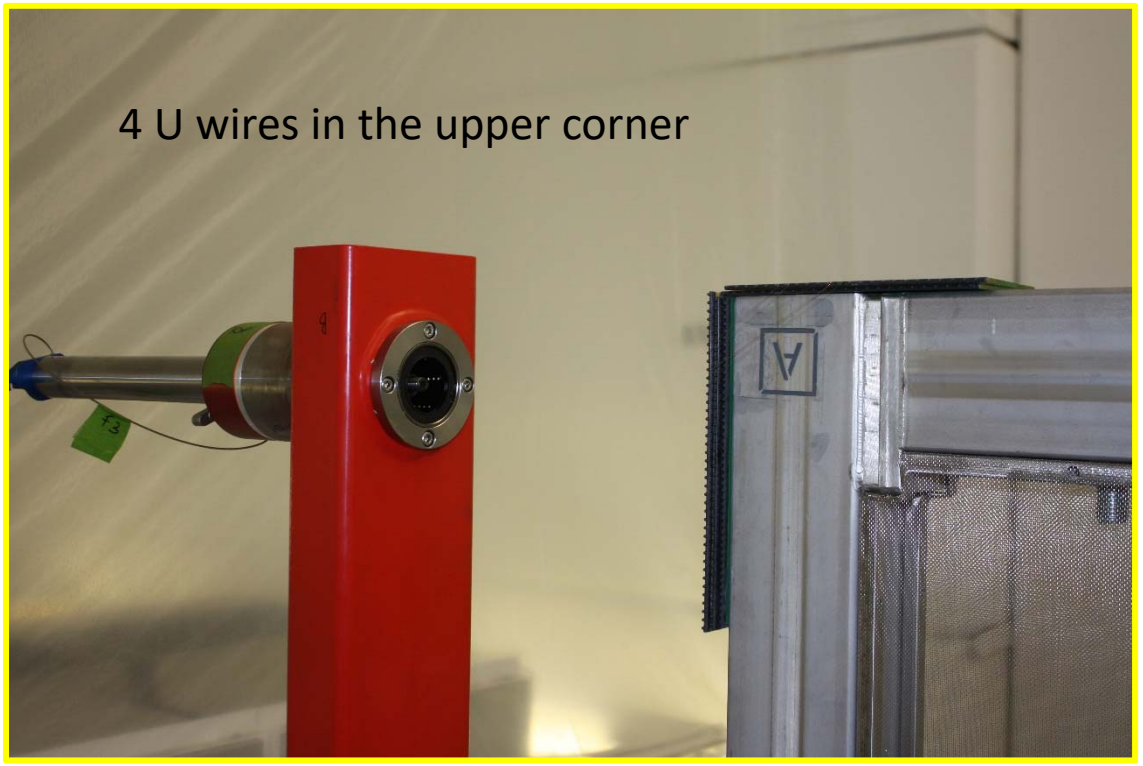
- Significant progress with P6 schedule
  - Fully resource loaded schedule available in P6 since last week
  - First cost roll-up done on Thursday (and mistakes fixed)
  - Cost uncertainty added today
  - Started to write fully detailed BoE files (over 20 to be done, half of them needed to get to 92% of total cost)
- Initial cost estimate is $60M from FY19 to FY27
  - Expect small reduction when university resources are properly implemented (for the moment we are using FNAL costs without overheads, this is an overestimate)
  - Small revisions (hopefully downward) still possible
- Discussions on SOWs with BNL and LBNL almost complete
  - For most other institutions starting extending old SOWs / start new ones not as urgent
  - Will discuss involvement of each institutions in the full construction project in the coming weeks, then work on SOWs for FY19 for Universities

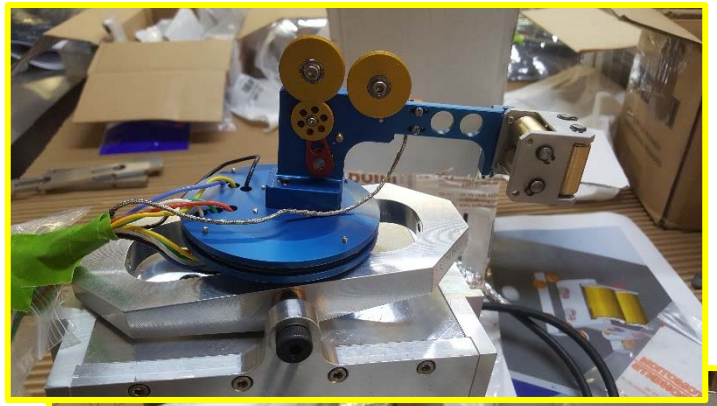
FD APA

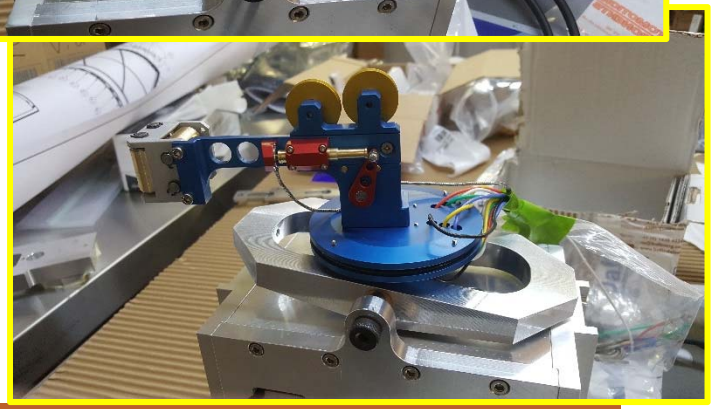
- Major effort in the last month to input APA cost & schedule in P6, with essential input from PSL, University of Wisconsin, on ProtoDUNE actual costs.
- Assumes 3 APA production sites in the US (U. Chicago, Yale U., PSL), with 2 + 2 + 1 winders
  - No attempts to customize costs to the different facilities
- Included activities for FY19, preparation of SOWs well underway for FY19
  - PSL, University of Madison, for designing and engineering in preparation of the TDR and CD2/CD3 review (~$1M). NSF contribution for FY19 has been taken into account.
  - Harvard University, for contribution to the Wire Measurement Task Force (~$70k)
  - University of Iowa, for participation in frame assembly at PSL and a machining test of APA frame components, (~$40k)
- Includes contingency estimates
- Total cost for 150 APAS (two 10 kt modules) dominated by labor, in the range $50-55M (without contingency)

FD APA

- All mesh panels delivered to Daresbury Lab and assembled on ProtoDUNE-style APA#7.
- Good progress in commissioning the modified winder, with participation of PSL personnel. Tested all wire configurations, in the order: X, V and U wires.
- Assembled the new winding head, with tensioning feedback mechanism. It will not be used, at least initially, for ProtoDUNE-style APA#7.







ProtoDUNE-SP Onsite

- Filling of ProtoDUNE-SP complete on 13 September
- Shifts began 23 August, with activation procedures.
  - "light version" shifts (i.e., two 4-hours shifts each day on weekdays, no nights, no weekends)
  - (1) develop experts on running the DAQ and performing basic troubleshooting. Almost all the first shifts are taken by people who will be at CERN throughout the beam run, to ensure there is a pool of people, in addition to the DAQ experts, who can assist or replace shifters as needed
  - (2) exercise DAQ and online monitoring, to assess stability, identify issues and debug
  - (3) Develop and constantly improve shifter manual and procedures. DAQ operations are progressively becoming more smooth and stable, and the documentation is being updated daily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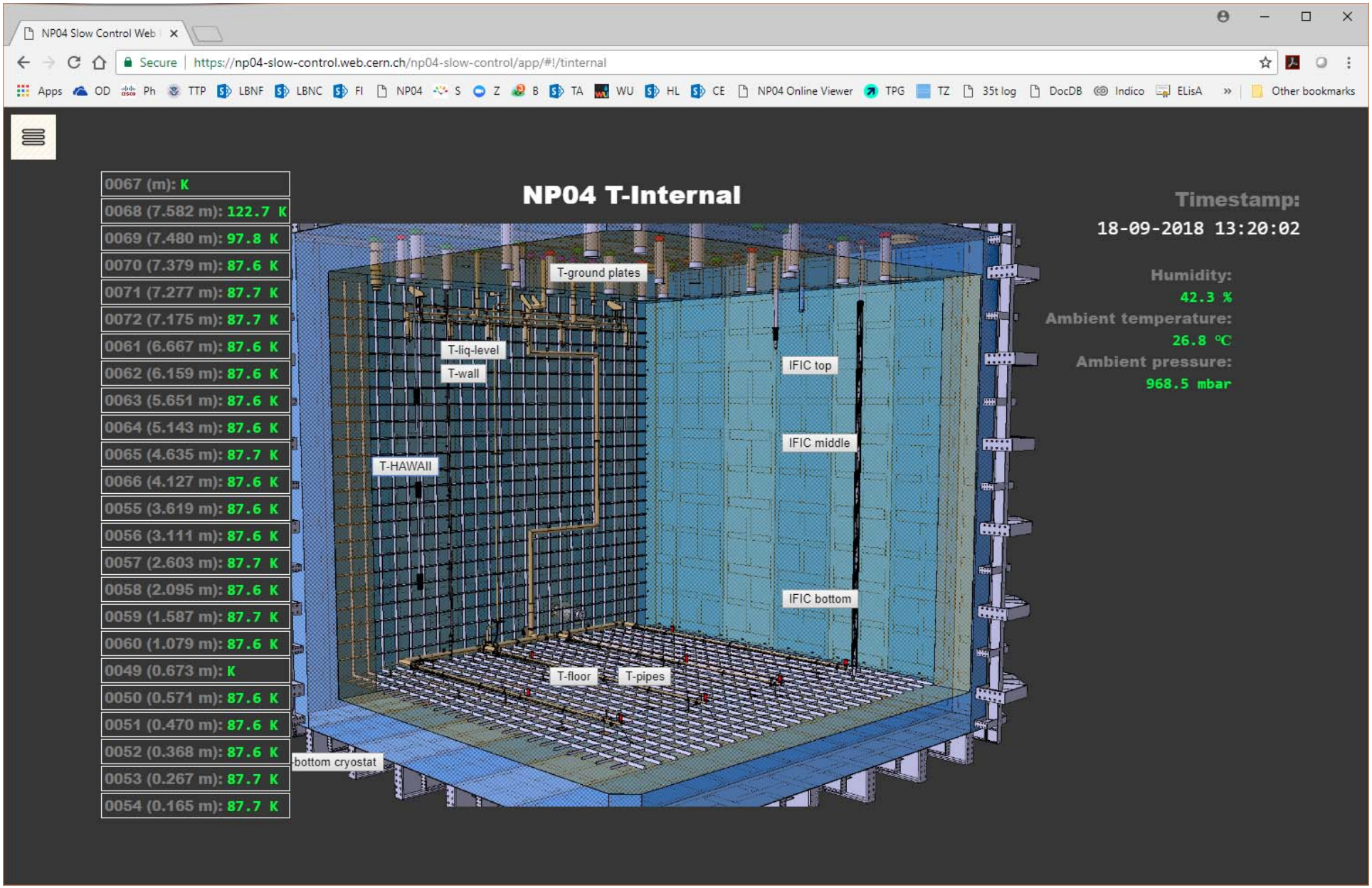
NP04 Slow Control Web
Secure | https://np04-slow-control.web.cern.ch/np04-slow-control/app/#!/tinternal
Apps OD Ph TTP LBNF LBNC FI NP04 S Z B TA WU HL CE NP04 Online Viewer TPG TZ 35t log DocDB Indico ELisA Other bookmarks
NP04 T-Internal
0067 (m): K
0068 (7.582 m): 122.7 K
0069 (7.480 m): 97.8 K
0070 (7.379 m): 87.6 K
0071 (7.277 m): 87.7 K
0072 (7.175 m): 87.7 K
0061 (6.667 m): 87.6 K
0062 (6.159 m): 87.6 K
0063 (5.651 m): 87.6 K
0064 (5.143 m): 87.6 K
0065 (4.635 m): 87.7 K
0066 (4.127 m): 87.6 K
0055 (3.619 m): 87.6 K
0056 (3.111 m): 87.6 K
0057 (2.603 m): 87.7 K
0058 (2.095 m): 87.6 K
0059 (1.587 m): 87.7 K
0060 (1.079 m): 87.6 K
0049 (0.673 m): K
0050 (0.571 m): 87.6 K
0051 (0.470 m): 87.6 K
0052 (0.368 m): 87.6 K
0053 (0.267 m): 87.7 K
0054 (0.165 m): 87.7 K
T-ground plates
T-liq-level
T-wall
IFIC top
IFIC middle
T-HAWAII
IFIC bottom
T-floor
T-pipes
bottom cryostat
Timestamp:
18-09-2018 13:20:02
Humidity:
42.3 %
Ambient temperature:
26.8 °C
Ambient pressure:
968.5 mbar


acer
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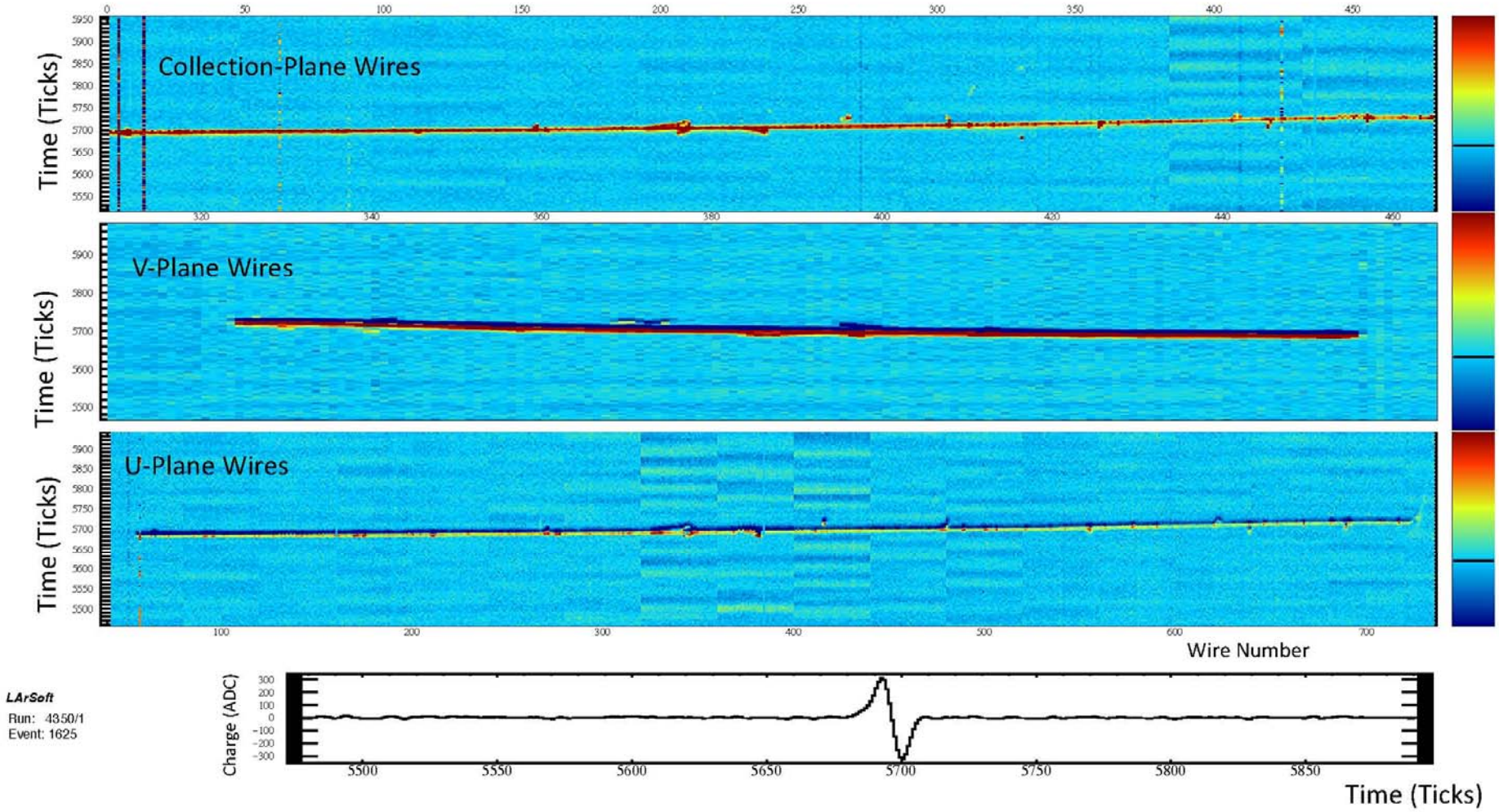
ProtoDUNE Event Display, 120kV



Upcoming Events

- DUNE Collaboration Meeting, 24-28 September at Fermilab
- Director's Cost/Schedule Review, 25-26 October at Fermilab
- LBNF/DUNE Integration Meeting, week of 29 Oct at SURF
- Integration Test Facility planning workshop, week of 29 Oct at SURF
- Installation 30% design review, TBD
- SP Photon Detector 30% design review, Nov TBD at Fermilab
- DAQ 30% design review, Dec TBD at CERN
- LBNC, 13-15 Dec at CERN
- DOE IPR, 8-10 January 2019 at Fermilab
- DUNE Collaboration Meeting, 28 Jan – 1 Feb 2019 at CERN

https://youtu.be/HNg49L4BNAE