DEEP UNDERGROUND NEUTRINO EXPERIMENT

IFIC group meeting
12/09/18

My summer activities in DUNE and ProtoDUNE-SP

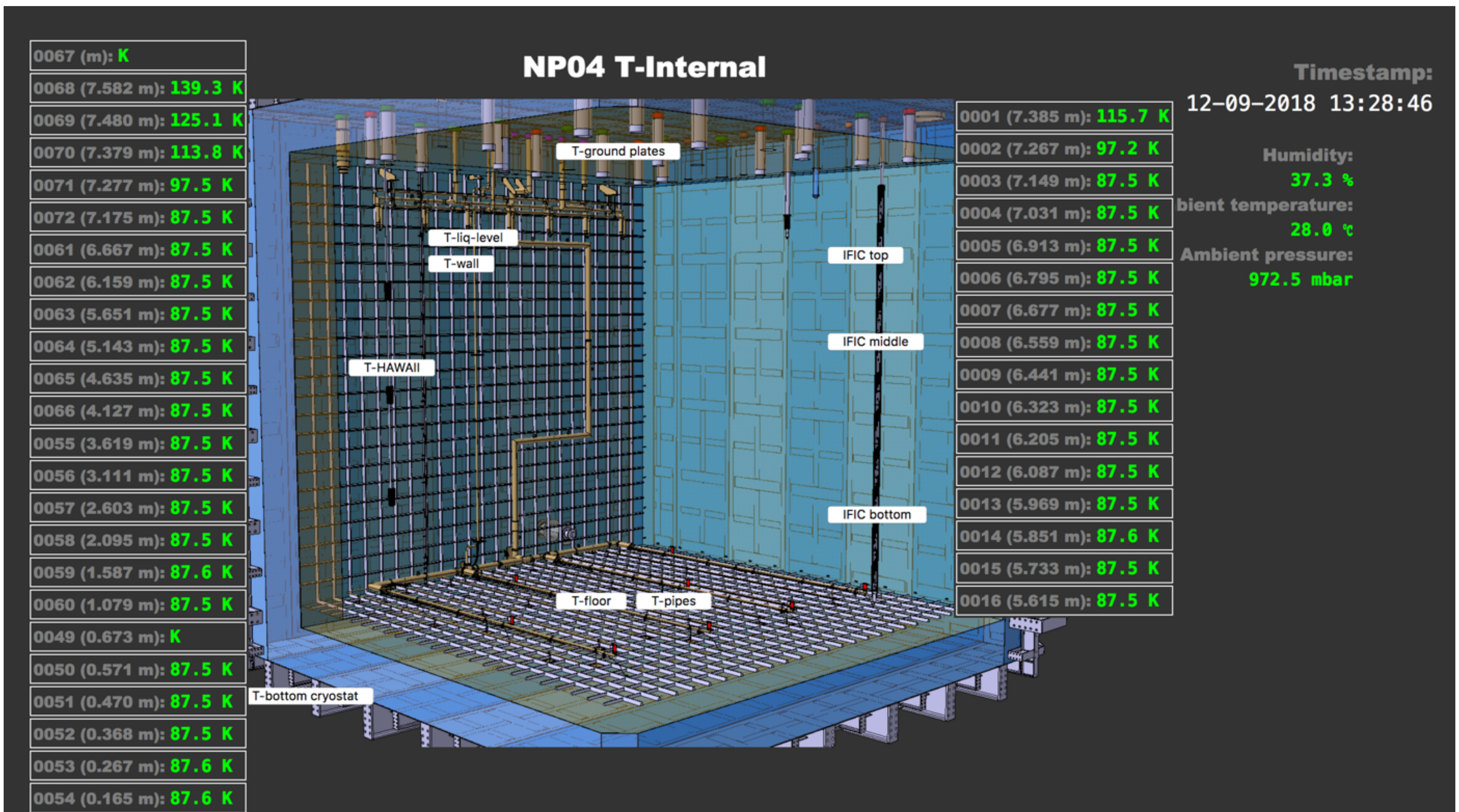
A. Cervera

IFIC-Valencia

ProtoDUNE-SP

- Cryostat almost full (7.15 m of LAr which corresponds to 715 tons)
- LAr already covering ground planes and HV rump up can start

https://np04-slow-control.web.cern.ch/np04-slow-control/app/#!/tinternal



Detector activation plan

https://indico.fnal.gov/event/18223/contribution/4/material/slides/0.pdf

1

Before end of filling

- Routine CE noise runs and PD test runs
- Routine Purity Monitor measurement
- After ground planes are covered with LAr, turn off the MPOD channel supplying the voltage to the cathode. Plug in the Heinzinger HV cable, and ramp the voltage to ~10 kV to test the control and monitoring on the system. Voltages up to 20 kV may be considered
  - CE noise run after voltage is set. Monitor current draw during and after voltage ramp
  - Should happen next Monday

2

Filling completed, before recirculation starts

Next Monday/Tuesday

- Check the LAr surface with camera, to see whether is flat or shows turbolences/bubbles
  - PD and FEMBs must be off
- Turn on FEMBs and check LAr surface with camera to see whether there are any difference with respect to the previous step
  - PD must be off
- Evaluate a new filter regeneration

3

After start of recirculation

Next Monday/Tuesday

- Check the LAr surface with camera, to see whether there are any difference with respect to the previous step
  - PD and FEMBs must be off
- Turn on FEMBs and check LAr surface with camera to see whether there are any difference with respect to the previous step
  - PD must be off
- Cameras, PD, CE turned on. LED and infrared lights turned off.
- Start HV ramping. First set wireplane bias and FC termination voltage to the value correspondent to the targeted Cathode voltage. Then ramp Cathode voltage to the target value
- During HV ramp, monitor CE current draw. At the end of the ramp, take CE noise run

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HV ramp: Day 1st

- Ramp rate: 60 V/s. Target voltage: 50 kV. Wait 30 minutes
- Ramp rate: 30 V/s. Target voltage: 90 kV. Wait 30 minutes
- Ramp rate: 30 V/s. Target voltage: 120 kV. Wait all night
- Take runs… should start to see something close to the wires now..

5

HV ramp: Day 2st

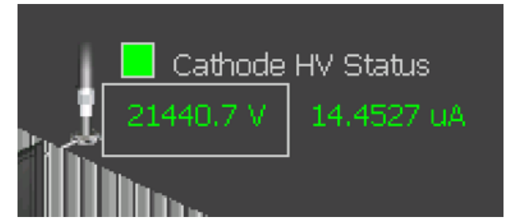
- Ramp rate: 30 V/s. Target voltage: 140 kV. Wait 4 hours
- Ramp rate: 30 V/s. Target voltage: 160 kV. Wait 4 hours
- Take runs… should see more now

6

HV ramp: Day 3st

- Ramp rate: 30 V/s. Target voltage: 170 kV. Wait 4 hours
- Ramp rate: 30 V/s. Target voltage: 180 kV. Wait forever
- Should be Thursday now. Time for our meeting
- Take runs and see how purity improves!

Next steps



- Today HV=-20 kV successfully
- Going to -180 Kv will take the rest of the week
- After HV ramp up recirculation will start
- The current lifetime is about 0.05 ms and it should go above 1 ms
- This will take between 2 and 3 complete cycles (a complete recirculation cycle takes 5.5 days)
- So we can start taking physics data by the end of the month

My activities

- Look at the DCS panels in general and make sure that everything works as expected. Solve few problems with Xavier and company
- I've been looking on temperature data with Migue
  - trying to understand how to retrieve the data from the DCS
  - temperature maps
  - vertical alignment between Hawaii and Valencia sensors
  - etc
- Install LArSoft and run it, with the help of Pablo
  - Play with it, build my own module, etc
- Manage to compile HighLAND with a new reader for the latest version of LArSoft files.
  - It took a while since I even had to install root 6

DUNE

- TDR must be ready by April
- During august we have been working on the WBS and cost estimates for the CISC consortium

TDR Schedule (Preliminary thoughts)

- September 1 - editors appointed
- October 1 - outlines due
- November 1 – first drafts due
- December 1 – second drafts due
- February 1 – input from independent reviews of second drafts
- March 1 – final drafts due
- April 1 – independent reviews of second drafts complete
- April 15 – submit final drafts to LBNC

Other Deliverables Required for TDRs

- Finalized Cost Workbook
- Final assignments of institutional responsibilities for detector deliverables (funding matrices)
- Finalized construction and installation schedule
- Complete set of interface documents

Cost for our devices

Static T-Gradient Thermometers (SP Module)				
Item	Cost/unit	Quantity	Total	Details/Comment
Material	14.390,00	6	86.340,00	6 T-gradient monitors, 3 in each side of the cryostat
Packing & Shipping	2.000,00	1	2.000,00	This covers the crating costs and the costs for shipping to FNAL for testing and then SURF for installation
Total M&S			88.340,00	
Travel	2.000,00	15	30.000,00	Travel needs to cover both the costs of development and testing, as well as the installation and commissioning work, $2,000 is estimated per trip of one week
Person-power				See the detailed "Person-power" table below

Cost Breakdown					
Item	Unit price (€)	Unit	Quantity	Cost	Details/Comment
Cable	10,00	m	500	5.000,00	48 sensors assuming and average of 10 m per sensor
Sensors	100,00	unit	55	5.500,00	48 sensors + 10% as backup
Connectors for sensors	10,00	unit	55	550,00	two IDC-4 connectors (male and female) for each sensor
Support structure	1.000,00	unit	1	1.000,00	Stainless steel string and associated achoring system
Flanges	585,00	unit	4	2.340,00	4 CF63 flanges with 2 SUBD-25 connectors each
one unit (total)				14.390,00	

Person-power							
Category	# of FTE (1 FTE = 1768 hours/year at Fermilab)	How long? (years)	Total hours	Cost/year	Total cost	Basis of Estimate	What Tasks?
Scientist	1	2	3536	0,00	0,00	University funded hence $0	Design, construction, calibration, assembly, installation and commissioning
Postdocs	0,5	2	1768	40.000,00	40.000,00	Estimate based on postdoc cost at IFIC, Valencia	Design, construction, calibration, assembly, installation and commissioning
Graduate Students	0,5	3	2652	20.000,00	30.000,00	Estimate based on postdoc cost at IFIC, Valencia	Construction, assembly, installation and commissioning
Engineers	0,25	1	442	30.000,00	7.500,00	Estimate based on engineer cost at IFIC, Valencia	Design, assembly and installation
Technicians	0,5	1	884	20.000,00	10.000,00	Estimate based on technician cost at IFIC, Valencia	Construction, assembly and installation
Total			9282		87.500,00		

Individual Temperature Sensors (SP Module)				
Item	Cost/unit	Quantity	Total	Details/Comment
Material	388,56	100	38.855,50	Assume 130 sensors, 65 above top GPs and G5 below bottom GPs, which corresponds to 1 sensor every 5 m
Packing & Shipping	2.000,00	1	2.000,00	This covers the crating costs and the costs for shipping to FNAL for testing and then SURF for installation
Total M&S			40.855,50	
Travel	2.000,00	15	30.000,00	Travel needs to cover both the costs of development and testing, as well as the installation and commissioning work, $2,000 is estimated per trip of one week
Person-power				See the detailed "Person-power" table below

Cost Breakdown					
Item	Unit price ($)	Unit	Quantity	Cost	Details/Comment
Cable	10,00	m	20	200,00	assuming and average of 20 m per sensor
Sensors	100,00	each	1,1	110,00	cost of sensor assuming a 10% of sensors as backup
Connectors for sensors	10,00	each	1	10,00	two IDC-4 connectors (male and female) for each sensor
Support structure	20,00	each	1	20,00	Teflon and FR4 pieces + SS bolts and nuts
Flanges	585,00	each	0,083	48,56	1 CF63 flange with 2 SUBD-25 connectors each for 12 sensors; this is the no. of flanges per sensor, above we multiply this by no. of sensors.
Total				388,56	

Person-power							
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