

# Minutes of ProtoDUNE-SP Integration, Test, and Installation weekly meeting February 2<sup>nd</sup>, 2017

## Attendees:

Roberto Acciarri  
Christos Touramanis  
Curt Lerol  
Jack Fowler  
Matthew Worcester  
Bill Miller  
Linda Bagby  
Anselmo Cervera Villanueva  
Zelimir Djurcic  
Terri Shaw  
Cheng-Ju Stephen Lin  
Flor Blaszczyk  
Xavier Pons  
Geoff Savage  
Stephen Pordes  
David Montanari  
Andrea Zani

Anyone I forgot: sorry!

## Meeting:

Small discussion at the very beginning between Xavier, Zelimir and Roberto regarding the purchase of a SSP crate for the Cold Box. It has been agreed that the options found by Xavier are good and that the crate will be bought using the Fermilab account at CERN. The same account can't be used though to purchase the cryostat SSP crates, for which different funds has to be identified.

Roberto presented a list of questions and news. A few suggestions about the use of the barracks located in EHN1 were done:

- use part of the control room or a whole barrack as a meeting room, which will surely be useful during the installation and test phase
- have a printer available in one of the barracks
- Bill asked whether there will be office space allocated in EHN1 or offices will be in the building in front (892). Roberto answered offices are foreseen in building 892, right in front of EHN1. Three office rooms are available now and more in the same corridor will be made available in the next weeks.

- Christos pointed out the need of start working on the layout of the Control Room.

About the characteristics of the oscilloscope to look at analog signals during Cold Box tests, Linda stated that it needs to be battery powered, as the separation between the two grounds has to be maintained even when looking at the analog signals. Xavier found a battery powered oscilloscope in the CERN electrical pool. It has also been suggested by several people that it would be more appropriate to buy such kind of oscilloscope, rather than relying on rented ones.

Cheng-Ju pointed out the need of a leak checker on top of the cryostat when installing and testing the beam plug N2 supply line and how this interfere with the no-AC power on top of the

cryostat requirement. It has been clarified that such prohibition applies to the data taking phase and when testing electronics inside the cryostat. It will be possible during installation to run temporary power cords on top of the cryostat when needed.

About testing the interface of the heaters to be applied on the cold box flange with slow control and monitoring, it has been determined that the latter will be available before the end of the Cold Box tests. The position and kind of humidity sensors needed to control the heaters need to be defined in a separate meeting. Linda has engineering drawings for the system used in MicroboonNE which could be used as starting point to define the characteristics and layout of humidity sensors for ProtoDUNE.

Second talk from Anselmo on temperature sensors for the cryostat and cold box.

Flor asked whether temperature sensors applied to the membrane cryostat are necessary from a cryogenic point of view, to control the cool down and filling process. Joint answer from Stephen and David Montanari: absolutely. As the temperature should be mostly uniform in X and Y, it is not important to have them distributed all around the cryostat, height is what matter the most. 1 sensor per meter in height should be plenty, plus a couple of sensors on the floor and on the top of the cryostat, asked for by David. 1 kelvin precision for these sensors is more than enough.

A discussion on the necessity and feasibility of putting temperature sensors on the APA frame and/or attach a support for RTDs to the APA frame, followed. What emerged is that it is rather difficult to attach supports or temperature sensors to the APA frame once everything is installed, due to the constraints given by wires, End Walls, and the installation of the End Walls. RTDs on the frame would be needed to make sure no excessive stress is applied to the frame during cooldown and filling, while supports with RTDs attached to the frame would be used to check the LAr temperature gradients once the cryostat is full, as test of the fluid dynamic simulations. It emerged from the discussion the APA engineer seems to be not really concerned about stress on the frame given by temperature, while the fluid engineer may not really care much about the XY temperature distribution, being more focused on a high precision measurement of the vertical temperature gradient as check of his simulations. Outcome of the discussion is that the instrumentation group will talk to Bo (for the APA stress concern) and to Eric Voirin (fluid dynamic engineer) to understand their requirement/concern and these information will be used to decide whether to install RTDs on and/or near the APAs.

In addition, Andrea and Stephen pointed out it would still be useful to have RTDs placed on the APA frame during Cold Box tests, to make sure the system is in the required 100 K range during tests. Additional RTDs may also be installed, for instance on the inlet gas pipe, or the APA support structure/beam.

Third talk from Geoff on computing has been moved to the next week, having the previous discussions filled a good full hour. In addition, Bill offered to talk next week about cryostat access during installation and required scaffolding.