

# Cold Electronics Status of Interface Documents

Marco Verzocchi

Fermilab

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# Relevant Interface Documents

- For this review the following interface document are relevant
  - with the APA consortium: [DocDB-6670](#) [[certificate link](#)]
  - with the PDS consortium: [DocDB-6718](#) [[certificate link](#)]
  - with technical coordination and the facility ( see sections 1, 2.1, 2.2, 2.3): [DocDB-6973](#) [[certificate link](#)]
  - with Integration and Test Facility and with Underground Installation Team
- All the interface documents are out of date and have NOT been maintained for months
  - There will be a push to update these in March

# Interface with APA Consortium (i)

- For each APA, the hardware interface between APA and CE has two components:
- Mechanical:
  - Mechanical supports for 20 CE boxes each housing a FEMB. The CE boxes are mounted in such a way that any of them can be removed after APA installation.
  - Cable trays on top of the APA assemblies for the CE electrical cables.
  - Routing of the CE electrical cables (this includes the power and readout/control cables for each FEMB, as well as the cables bringing the bias voltage for the wire planes, the electron diverters and the field cage electrodes) from the head frame of the lower APA of a 2-APA assembly, inside the beams of the two APA frames.
- Electrical:

# Interface with APA Consortium (ii)

- Electrical:
  - .....
  - Cable connections for the wire-bias voltages from the cryostat feedthroughs to the APA SHV boards and following connections to the CR boards.
  - .....

# Interface with APA Consortium (iii)

- Design:
  - Current document does not reflect reality, need to adapt
  - I think that there is good communication on these issues between APA, CE consortia, and with technical coordination
  - Work gets discussed mostly in the technical coordination meetings run by Farshid
- Production
  - Need to agree who is providing the cable trays (document says APA consortium, in the US schedule these may now be only on the CE budget)
- Testing
  - Need to update text, new tests were agreed upon in the last few months and plans have been made / are in progress

# Interface with APA Consortium (iv)

- Integration / Installation
  - To be revisited when we have a defined plan (although share of responsibilities between APA and CE is very clear, cannot claim the same with the facility / technical coordination)

# Interface with PDS Consortium (i)

- This document needs a significant rewrite
- Some parts of the document are out of date (we no longer share the racks on top of the detector)
- Cryostat penetration, grounding scheme: still valid
- PDS flange [should have been part of this review]
  - QC tests done by CE consortium in ProtoDUNE, what are we doing for DUNE ? Same approach ?
    - CE consortium was not entirely happy with the connector design, need to rework some flanges (add sealing) to ensure that there would be no leaks

# Interface with Facility (i)

- Only Section 2 (Detector Integration) and Section 3 (3.1 to 3.3) are relevant
- Boundary between CE and Technical Coordination changed multiple times
  - Now cryostat penetrations and ALL cable trays are responsibility of CE consortium
  - Design done by Manhong, regularly presented in the Technical Coordination meetings run by Farshid
  - Need to specify when the cryostat penetrations are going to be installed
    - Relatively early in the schedule, needed to seal the cryostat such that you can clean it inside

# Interface with Facility (ii)

- Before Engineering Design Review we need to specify the QC procedures for the cryostat penetration
- For ProtoDUNE
  - Pressure test performed by vendor
  - Helium leak tests performed after installation of cryostat penetrations, closure of CE/PDS flanges after cable installation
- Is this sufficient for LBNF ?
  - Are welding inspections (X-rays) required ?
  - Would like to know early to include in the plans

# General Comments

- Current drafts of Interface documents are purely text
  - No diagrams included
- Propose to
  - Update text to reflect current understanding in March/April
  - Add schematics / drawings in another iteration
- What drawings ? What timeline ?
  - Do we consider links to documents in EDMS sufficient ?
  - Just the 3D model (how do we highlight what is CE responsibility and what is the responsibility of the 2<sup>nd</sup> party ?)
  - Envelope drawings ? Projections ?
  - Need guidance from Technical Coordination