

## US BOTTOM CRP AND BDE UPDATE

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Cheng-Ju Lin

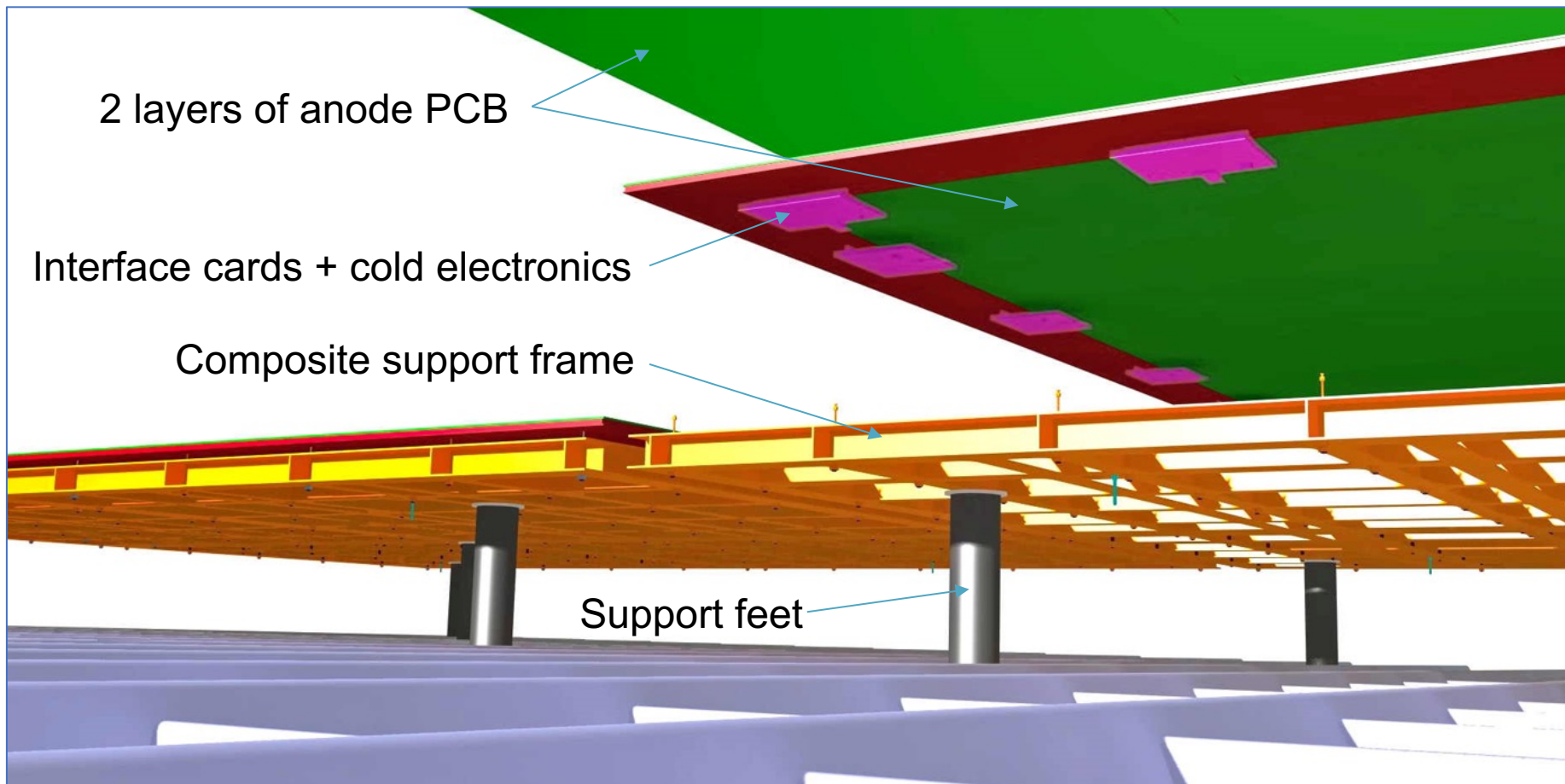
Matthew Worcester

US CRP/BDE Meeting

January 19, 2022

# Bottom CRP

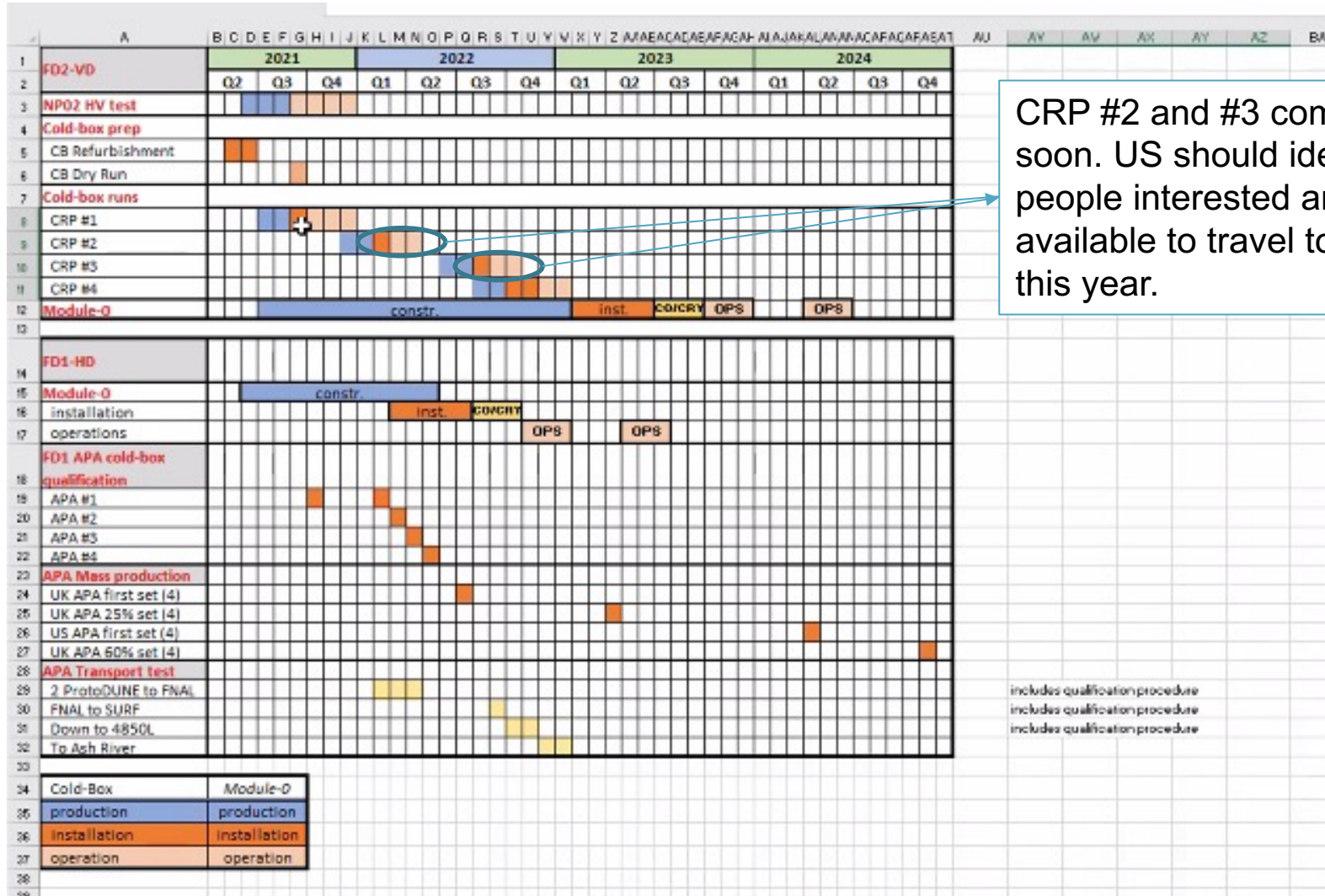
80 3x3m<sup>2</sup> CRP are required for FD-2



# Overview

- This meeting is intended to cover bottom CRP and readout electronics effort in the US
  - Biweekly starting from today if the time slot still works for most people
  - Not just an “interface” meeting
  - Try not to overlap content with the CRP and CE consortia meetings
- Today’s outline:
  - Module 0 and CRP #4
  - Assembly factories
  - Installation in FD-2

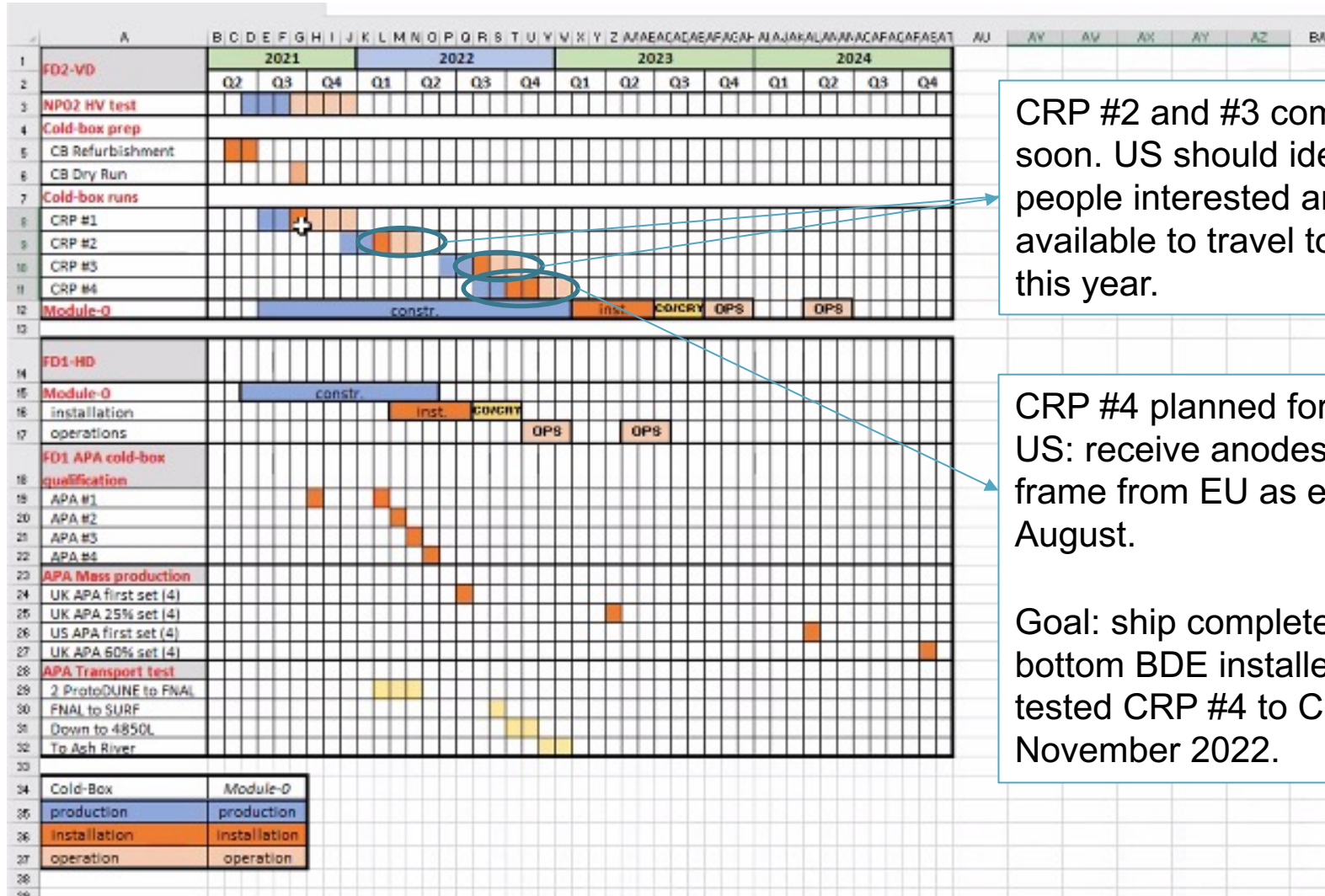
# Module 0 schedule



CRP #2 and #3 coming up soon. US should identify people interested and available to travel to CERN this year.

includes qualification procedure  
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# Module 0 schedule



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CRP #4 planned for in the US: receive anodes and frame from EU as early as August.  
Goal: ship completed with bottom BDE installed and tested CRP #4 to CERN by November 2022.

# CRP #4

- Plan is to assemble CRP #4 at Yale using US effort
  - Need to identify US members who are interested and available to travel to Yale in September-November
  - For CRP #1 CERN/IN2P3 had a team of 5-6 people plus CE team of 2-4 people from BNL+LBL during BDE installation
- Expect that anode PCB will be glued at CERN prior to shipping and composite frame will be produced in France
- Testing
  - As the FEMBs are installed, use a single-WIB test readout system to power and test each FEMB, as was done for CRP #1
    - Identify dead channels, other FEMB-level issues
  - A cold test in LN2 would be very useful prior to shipping to CERN
    - Options: construct a simple cold box at Yale that could submerge a CRU OR ship completed and warm-tested CRU to BNL to test in the BNL simple cold box
- BNL engineering working on shipping fixture design

# More Module 0

- Currently planning to deploy two top and two bottom CRP with the cathode in the middle of the cryostat
  - Plan is evolving, but the most recent baseline is for CRP #2 and #3 to have top readout electronics and another CRP (#1, #5??) will have FEMBs installed at CERN and tested in the CERN cold box
  - We will need bottom CRP feet for two CRP ready at CERN in early 2023 (see Ian's update on the feet at today's CRP consortium meeting)
- US will need experts at CERN in 2023 for module 0 installation and commissioning
  - The Jura is lovely in February...

# Bottom CRP factories

- Current plan is for two bottom CRP factories in the US
  - Each factory responsible for 40 bottom CRPs (plus “spares”)
  - Factories expected to be in production from Oct 2025 – Apr 2026
- Assumptions
  - We can assemble, test, and ship CRU-size detectors
    - Final connection into CRP will be done during installation (see next slide)
  - Anode PCB will be produced and glued in EU: US will receive full CRU-sized anodes and CRU sized composite frames
  - Cold test of each CRU with BDE installed will be done at factories
- Goal is to have a QC teststand at each factory that can fully test 6 CRU at once in GN2
  - CE Consortium will provide the QC teststand for the CRP factories
- US bottom CRP factory discussion later on



# Bottom CRP installation

- Bottom CRP will be installed after top CRP, cathode and field cages
  - Need to work on the membrane cryostat floor
- Idea is to bring CRU into cryostat in shipping fixtures
  - Implies no cold test at SURF prior to installation
- Assumptions
  - Need to have a fixture to lift CRP out of their shipping crates, which has a further assumption that the bottom CRP have been flipped to “anode up” position during assembly
  - Another fixture will hold two CRU while the CE are cabled up and tested and the CRU are connected into a CRP
    - Has implications for patch panel for CE cables (Cheng-Ju’s slides)
  - CRP can be lowered onto support feet and leveled relative to cathode

# Mailing list

- Meeting reminders will start going to just the mailing list:  
[dune-fd-us-crp-l@lists.bnl.gov](mailto:dune-fd-us-crp-l@lists.bnl.gov)
- Go to <https://lists.bnl.gov/mailman/listinfo/dune-fd-us-crp-l>  
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