LBNC Meeting Report

February 26-28, 2024

Frascati National Laboratory, INFN

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Introduction

The LBNC met in person on February 26-28th, 2024, in Frascati , Italy.

The attendees at the meeting, shown in Appendix I, included LBNC members and consultants, DUNE Collaboration spokespeople, Mary Bishai and Sergio Bertolucci, the interim LBNF/DUNE-US Project Director, Ron Ray and several LBNF/DUNE members, the Fermilab Deputy Director for Science and Technology and CRO, Bonnie Fleming, the Head of the Fermilab DUNE Coordination Office, Steve Brice, the Chair of the FNAL Physics Advisory Committee, Hiro Tanaka, the Char of the Neutrino Scope Group, Dmitri Denisov, and representatives of the US DOE.

The LBNC is a review and advisory committee charged by and reporting to the Fermilab Director. The charge includes making recommendations concerning the Conceptual and Technical Design Reports for DUNE to the Director. The LBNC reviews DUNE from a scientific, technical, schedule, risk and management perspective while the Neutrino Scope Group reviews scope and schedule associated with DUNE construction. Specifically, the purpose of the LBNC is to review the scientific, technical, schedule, risk and management plans and decisions of the DUNE experiment, and to provide reports and recommendations to the Fermilab Director; the reports are made available to the DUNE Collaboration, LBNF/DUNE-US Project and the DUNE RRB. The LBNC scope does not include review of LBNF or PIP-II beyond the relevant interfaces impacting DUNE, as these projects are reviewed through the U.S. project management process. The status and progress of LBNF and PIP-II relevant to the LBNC charges are summarized in a single presentation at the beginning of the meeting: at this meeting the discussion of progress with the beamline is also included in the LBNF report.

The charge for this meeting, prepared by the Deputy Director for Science and Technology, is shown in Appendix II.

For each meeting the LBNC is organized into small groups which concentrate on particular components of the presentations and the discussions. The makeup of the teams for this meeting is shown in an Appendix III. The committee as a whole discusses and reaches a consensus for both the Closeout Report and the Meeting Report.

We hold up to three general meetings a year and intermediate shorter and targeted reviews as the need arises. At each meeting the LBNC makes the Closeout Report open to all, and subsequently prepares this LBNC Meeting Report. The agenda and presentations used for the meeting, the Closeout Report, and this report can be accessed at**:** https://lbnc.fnal.gov/

Again, for this meeting, the presentations have been excellent. The LBNC expresses its appreciation for the work of the DUNE and LBNF participants in preparation and presentation of all the material for this review. LBNC thanks INFN-LNF, its Directorate and its support staff for the great hospitality, assistance and support. Finally, the committee thanks Fermilab, its Directorate, and its support staff, for their assistance and support in making this meeting possible and productive.

Executive Summary

LBNC congratulates DUNE and LBNF DUNE for progress made on several areas, with one of the major highlights being the completion of the Far Site excavation, and the significant progress made on the Building and Site Infrastructure (BSI) subproject. LBNC commends DUNE on the progress made towards addressing the FDC CD2/3 recommendations, with a goal to satisfy them and get CD2/3 approval in the Fall of 2024.

LBNC acknowledges the challenges and possible delays from various sources, related with the execution of the plan for the installation of the DUNE FDs with a goal of FD Physics starting in 2028. LBNC understands that, as a response, an aggressive mitigation strategy has been proposed by DUNE/LBNF with FD-VD being the first module that will be installed. LBNC notes that there is risk associated with this decision and would like to see the steps that will be taken to mitigate it, starting with a successful operation of the ProtoDUNE-VD in the earliest possible timescale, currently anticipated in the Fall of 2024, and continuing with the Production Readiness Reviews in 2024 and 2025.

LBNC urges DUNE to take all necessary steps, and perform all needed investigations and studies, possibly forming a dedicated Task Force, in order to fully understand and subsequently mitigate the APA broken wires issue as well as its implications for the August FD-HD Production Readiness Review and for actual FD-HD operations.

LBNC commends LBNF/DUNE for the progress made on the beamline systems that are at 70% design completion, with the horn prototyping and the beam instrumentation plans advancing, capitalizing on the NUMI experience.

LBNC congratulates DUNE on the successful installation of the 2x2 Demonstrator in the NuMI beam at Fermilab, a critical step of the ND prototyping. LBNC is happy to see the evolving DUNE plans towards the ND PDR and TDRs in view of the CD2 & CD3 reviews in the next two years. LBNC urges DUNE to continue and strengthen the efforts on developing ND simulation and reconstruction including all sub-detector systems, and their utilization for the updated neutrino oscillation analysis for the TDR. LBNC would welcome a complete PDR for a full review in the coming months, and is prepared to provide quick feedback on individual chapters as they become available.

LBNC commends DUNE for progress made in computing, in terms of organizational structure and effort growth, on the core software framework project, and on preparations for ProtoDUNE II operations. LBNC expects to see, at the next meeting, mapping of the physics requirements with computing requirements, and a more coherent and concrete plan on the overall framework development, and testing, accompanied with intermediate milestones and a rough timeline.

LBNC acknowledges the strong endorsement of DUNE Phase II from P5 and is pleased to see that DUNE has completed a first draft of the Phase II White Paper. LBNC commends DUNE for the significant progress made towards defining a baseline scenario for Phase-II FD & ND, but would like to see a more detailed schedule and aggressive timeline for its realization given that, according to a technically limited schedule, FD3 should be ready to start filling in 2033, and

given the central role the Phase II ND will have to play in the reduction of systematic uncertainties at the level needed for CPV discovery. Related to this, LBNC also looks forward to hearing an update on the preparations for ACE-MIRT upgrades.

LBNC commends DUNE on progress made on continuing to produce publications with ProtoDUNE-SP data, on developing full simulations and reconstruction for both the ND and the FDs, and on the plan to utilize those in an updated DUNE oscillation analysis. LBNC notes that it would be good to increase the resources devoted to the development of the various DUNE reconstructions (ND 2x2, ND-LAr, FD-VD, FD-HD). LBNC is happy to see that a dedicated board is now formed to establish channels of communication between the computing and offline software communities, and to coordinate the offline software evolution between the different consortia.

LBNC commends DUNE for rapid progress made towards installation and plans of subsequent commissioning of ProtoDUNE-HD-II and ProtoDUNE-VD with beam and cosmic events. LBNC re-emphasizes the importance of the ProtoDUNE-VD 2024 & 2025 running, and urges DUNE to develop/refine a plan that will allow findings from ProtoDUNE-VD to inform the final installation in FD-VD.

LBNC is pleased to see replies to some of our previous recommendations being incorporated in the various presentations. LBNC would like to suggest that replies to all of our recommendations are provided by the DUNE Collaboration in the "recommendations tracker", such that we can review and approve afterwards.

LBNC would like to kindly remind DUNE and LBNF/DUNE to make draft talks available at least six days ahead of the meeting in order to provide sufficient time for the committee to review the material ahead of time.

LBNC thanks our Colleagues in Frascati for the great hospitality, the tours to see components of SAND, and a very successful meeting!

LBNF Status

Comments:

The completion of far-site excavation marks a remarkable milestone in the project. The concrete flooring and the installation of pedestals for equipment installation is in progress in all caverns and the majority of Building and Site Infrastructure construction work is in preparation or has already been awarded. - Congratulations!

A shear zone in the west end of the south cavern may lead to settlement issues for FD4. The decision to eliminate pedestals for FD4 and just pour the concrete slab and reassess in the future when more is known about FD4 seems reasonable.

Safety records remain better than industry standards. Pivoting from excavation to installation

work, the project should nurture the safety culture, provide training for the upcoming tasks and new personnel, and identify lessons learned to retain this track record.

The transition from Excavation to Building and Site Infrastructure (BSI) activities will have to be managed carefully to ensure safety, integration of the BSI scope, and efficient space/time usage by multiple subcontractors.

Work on the near-site conventional facilities and beamlines remains funding limited but has started to ramp back up as the cash-flow imposed break is coming to an end. CF design is completed and a CD-2/3 IPR is planned for Fall 2024. Critical funding authority is required soon to avoid delays in construction work.

The design of near-site beamline systems is at 70% design completion and the LBNC is looking forward to supporting the review of the beamline TDR in the coming months.

Cash flow uncertainties continue to be a point of worry for the project. In light of the steep ramp-up of projected spending in FY24-25 it is important to keep on top of strategic contingency planning to avoid further delays.

LBNF/DUNE should capitalize on the successful completion of excavation work in communicating the project's capability of completing critical aspects of the project to the shareholders. The LBNC shares the project's concerns about the early depletion of contingency funds and urges LBNF/DUNE to focus on completion of high-priority tasks.

Recommendations:

1. In the future, please clearly address the scope that is connected to the LBNC review charge throughout the applicable presentations and breakout sessions.
2. Keep the LBNC informed of any changes to the LBNF/DUNE management structure or of the management team.
3. In preparation of the next LBNC review, provide clear responses to previous recommendations and track progress on any actions arising from recommendations.

DUNE Status

Findings:

The committee acknowledges the significant milestones that have been achieved since the last LBNC meeting, including the signing of the multilateral MOU for FD1 and FD2, the completion of the Far Site excavation, and re-organization of the DUNE software and computing. Ongoing activities include the preparation of a bilateral DOE-INFN MoU to handle the SAND installation

that will be signed in April, and the preparation of a White Paper by the DUNE Phase-2 organization.

A 5-month delay in the Acceptance for Use and Possession (AUP) of the first cavern by FDC was reported and mitigation strategies to minimize the impact on Physics Start Date are being put in place. For example, a task force was appointed to make recommendations on the installation order of the first two Far Detectors, and recommended to proceed first with the outfitting of the South cavern and installation of FD2. The task force was also asked to make a recommendation on the filling order of ProtoDUNE prototypes, and recommended to proceed to fill ProtoDUNE HD first. Discussions of these recommendations with the DUNE RRB are ongoing.

It was noted that the original plan to expose both NP02 and NP04 to beam in 2024 is no longer possible due to the lack of availability of LAr in 2023. Additional beam time will instead be requested in 2025 for NP02.

The recent P5 report recommendations are viewed as a strong endorsement of both phases of the DUNE project.

Comments:

Significant scientific involvement will be needed from the DUNE collaboration for the installation and integration of FD1 and FD2, and the collaboration is taking steps to understand the amount of resources that will be needed and that will be available within the collaboration for these activities.

The committee wishes to re-emphasize the importance of prioritizing and learning everything that can be learned from ProtoDUNE VD as soon as possible, particularly in light of the task force recommendation to proceed first with the outfitting of the South cavern and installation of FD2.

The LBNC wishes to continue to receive regular status updates on the DUNE collaboration composition and opportunities to possibly grow the collaboration.

Recommendations: None

FD2 Vertical Drift

Findings:

The committee acknowledges the rapid technical progress on all fronts. The final design reviews were completed in May 2023, while the Technical Design Report was approved and recently accepted for publication.

The updated design is validated by extensive tests in the coldbox and in test stands. Charge Readout Plane (CRP) modules 6 and 7 have been re-engineered to reduce assembly time and

increase sturdiness. They are being tested in the coldbox prior to the PRR scheduled in June 2024.

The NP02 Vertical Drift TPC is already installed, but it will host upgraded Photon Detectors (PD) before filling in late summer 2024 after NP04 operations ends. The opportunity for a beam test will be in 2025.

Production Readiness Reviews (PRR) are planned for 2024-25. Only the HV PRR depends on tests done during ProtoDune operation

Considering the updated schedule for the far site preparation and the detector construction, the Far Detectors installation sequence has been proposed, with FD2-VD coming first. This order has the potential of recovering some schedule, maintaining the physics start date. This recommendation is needed now to allow a timely start and optimization of cavern outfitting. without delays or additional costs.

Preparations for the installation mockup at CERN is underway.

Comments:

The proposal to swap the order of installation FD1-FD2 was developed rapidly, with a still evolving design. This choice carries significant risks, but it keeps open the window of opportunity for a FD physics run to start in 2028.

Should there be any delays in the ProtoDUNE HD (NP04) run, the collaboration needs to be ready to move to the operation of ProtoDUNE VD (NP02) as soon as all prototype components are available.

We commend the team for following the LBNC recommendation tracker and formally proposing to close recommendations 2022-286/287 and 2023-294, which we agree upon.

Recommendations:

1. Detail at the next meeting the steps needed to ensure the readiness of the VD design at system level and the viability of the production and installation schedule in order to successfully execute the recent FD1-FD2 installation sequence proposal.
2.

FD1 Horizontal Drift

Findings:

On the NP04 neutrino platform at CERN North Area, the temporary construction opening (TCO) was closed at the end of 2023. The Anode Plane Assemblies (APA), cold electronics (CE), and HV system are regularly tested, and cryogenic operations can start. LAr delivery is scheduled to start in March. Beam operations are tentatively planned for July and August.

For the APA production in the UK, a new lead engineer was hired and has been on board since last October. Sixteen offers have been made for technician job openings, with twice as many applicants. Four of five winders have been commissioned. Winding of two APAs has been carried out during the last four months. Three broken wires have been found on one of the two APAs being constructed, with mechanical damage observed in the region of the breaks – investigations are ongoing. An updated APA production schedule is being prepared, foreseeing the incorporation of two parallel assembly lines. Validation is starting in April, with a PRR "refresh" to be scheduled for summer.

For the APA production in the US: a first APA winding is underway in Chicago, with the first layer completed successfully.

An APA Project Management Board has been formed to oversee APA module production at the two factories.

Comments:

We commend STFC for significantly strengthening the UK APA production team, including hiring a new lead engineer and the job offers made to sixteen technicians.

The hiring of the new UK lead engineer, who has taken on the responsibility for work planning and operations at the Daresbury factory, is already producing positive effects with the ongoing preparation of a new production plan that anticipates two parallel production lines. This new plan, to be validated and reviewed in the next few months, comes with the potential for, eventually, a significant increase in production rate.

Although pleased that the transition toward a production model in the UK has continued with the winding of two APAs in the last four months, we share the team's concerns about the three encountered broken wires, with wire damage observed in the nearby areas. We fully support and encourage the investigation efforts aimed at identifying the origin of the problem, with the goal of implementing mitigations to prevent these damages from occurring during the rest of the production.

Recommendations:

1. The recommendation from the October 2023 LBNC remains open: develop an updated APA production plan and schedule, which would then be reviewed and validated at an internal review, which is now foreseen for May 2024
2. Form or strengthen a dedicated task force to investigate the source of the wire damages that led to broken wires. Consider if additional actions could be implemented during winding and assembly that could facilitate post-mortem investigations.

Phase-2

Findings and Comments:

The LBNC is pleased that the Collaboration has established an organization towards developing its Phase-2 programme, and we are looking forward to receiving a Phase-2 White Paper.

To achieve the Phase-2 physics goals within the P5 baseline scenario, it is important that the increase in the beam intensity (through the ACE-MIRT upgrade) be implemented as soon as possible. LBNC looks forward to hearing an update on the preparations for ACE-MIRT upgrades at a future LBNC meeting.

DUNE Phase-2 organization has identified the main R&D challenges for leading technologies considered for FD3/FD4; it would be useful to understand if sufficient R&D resources are already available for these activities.

Recommendations: None

Near Detector for Phase I

Findings:

Steady Progress has been made on the design of the Phase I Near Detector, with the 2x2 prototype installed in the NuMI beam, almost ready to be filled and to receive beam. A full simulation of the 2x2 prototype has been developed and is almost ready for production runs.

The collaboration is working on the Preliminary Design Report (PDR) for the ND, aiming for CD2 in late 2025 and CD3 in late 2026. Installation is foreseen to begin in mid-2028.

Comments:

The LBNC is happy to see the continuing development of the physics program, of the Near Detectors, which includes not only the central task of controlling systematics for the oscillation measurements, but also a rich program in neutrino interaction physics and physics beyond the Standard Model.

The current focus is on developing the full simulation suite for the Near Detectors, with an updated oscillation analysis delayed to 2025. This results in an uncertainty on the impact of the near detectors, which may become a risk in case decisions need to be taken in the future to satisfy budget constraints.

The committee is prepared to provide preliminary feedback on individual chapters of the PDR, though it should be understood that a final set of comments (on all chapters) can only be delivered once the PDR is available in its entirety.

The committee is pleased to see significant progress in the KLOE-to-SAND project. Preparation

of the KLOE magnet and calorimeter for SAND is progressing well, though the new components of SAND (the tracker and the GRAIN liquid argon detector) are at the stage of building full scale prototypes, and technology choices still have to be made to proceed with the PDR.

Possible Phase-2 upgrades of the Near Detector are currently not a priority for the collaboration. This is reasonable, though the upgrade, which will be necessary to achieve DUNE's physics goals, should not be lost from sight. In particular, this may be an opportunity to bring in new international collaborators.

The LBNC encourages the collaboration to work closely with the project to ensure that the availability of SAND components is compatible with the overall DUNE schedule.

Recommendations: None

Computing

Findings:
Initial efforts to develop a computing framework have commenced, with the establishment of a task force dedicated to assessing needs and compiling a requirements document. Concurrently, offline databases are being actively developed, involving stakeholders throughout the process. The scope of the DUNE software and computing consortium has been clearly delineated, pinpointing which aspects of computing fall outside its boundaries. The organization has undergone updates, introducing additional groups and redefining technical roles to better meet objectives. To enhance the efficiency of communication and decision-making, the Computing Resource Allocation Board (CRAB) was formed. A provisional timeline for the framework's development was shared, featuring an independent expert review of the design requirements scheduled for the summer of 2024. Efforts are in progress to articulate a document that clarifies the relationship between physics and computing, taking into account feedback from recent reviews. Development of software to support ProtoDUNE-II operations is moving forward, with the current support for ProtoDUNE-II data collection proving sufficient as illustrated by the successful execution of several recent stress tests.

Comments:

We find the current organizational structure well-suited for the tasks at hand and emphasize the importance of promptly appointing a new consortium lead and board. The formation of the frameworks task force is recognized as a positive step, ensuring stakeholder representation in framework development, and this task force should be naturally integrated into the Computing Resource Allocation Board. There is an ongoing need to delineate clearly what falls within the consortium's scope and establish protocols for interfacing with external stakeholders. The justification for creating a new framework tailored to DUNE's specific data processing

requirements has been well articulated, and we look forward to its technical rollout. The timeline set for finalizing the framework's design requirements, with a review scheduled for Summer 2024, is deemed suitable. Post-review, the collaboration is urged to quickly develop a detailed execution plan. We commend DUNE's proactive approach, conducting dry runs in preparation for ProtoDUNE-II.

Recommendations:

1. Create a schedule for framework development with deliverables, associated timeline, effort and resources needed, and present it at the next LBNC meeting.
2. Estimate the requirements needed to exercise the new framework on the ProtoDune and ProtoDune II data and present this at the next LBNC meeting

Beamline Status

Findings:

An overview of scope and structure of the Beamline TDR has been presented. The document will be submitted to the LBNC for review April 1 with the request for review by July 1. Using the additional slides at the end of Ron Ray's LBNF Status presentation, an overview of the beam monitoring devices has been provided. The NSCF+B subproject is managed by Mary Convery, the beamline itself is now managed by Cathrin James. Managers were not in attendance.

Comments:

The draft TDR represents an impressive body of work and summarizes the technical development and design of all major beamline systems, including the primary beam instrumentation, the neutrino beam generation, integration and controls aspects, as well as relevant radiological considerations. The completion of this document is an important milestone for the subproject.
The table of content indicates appropriate scope and level of detail for this document in preparation of a CD-2/3 IPR. However, the document itself has not been presented to the LBNC.
From what has been presented, the TDR document appears on track for completion and submission to the LBNC by April 1. The LBNC is aiming at providing a document review report in advance of the Director's Review, which is currently scheduled for July 30.
The beam monitoring strategy and design of devices are based on designs and experience at NuMI and appear reasonable. The level of technical understanding and of interplay of the different devices towards safe, reliable and high-performance operation are convincing to the LBNC.
The beamlines subproject is making it back to the top of the pile of priorities in preparation of steeply ramping up effort and spending in the coming 2 years. The subproject is therefore steered towards CD-2/3. Despite the fact, that evaluating CD-2/3 readiness is a focus of this LBNC

review, questions from the subcommittee on non-technical aspects, such as project progress, capacity management, schedule, cost estimates, absorbed magnet scope, interface management have not been answered, but are necessary for the LBNC to evaluate CD-2/3 readiness.
Responses to previous recommendations have not been presented and related questions have not been answered.

Recommendations:

1. At the next LBNC meeting, provide a comprehensive status update, including technical and project management aspects. Allow for discussions with NSCF+B management.

DUNE and ProtoDUNE Physics Program

Findings:

Analysis efforts are making steady progress, but are still person-power limited, as evidenced by the fact that the update of the oscillation analysis including full ND simulations has been postponed to 2025. First DUNE physics measurements with data is imminent, which will constitute an important milestone. Together with the SBL LAr experiments, a new GENIE tune, as well as a new model for cross-section systematics, has been developed. At the same time, great progress has been made in implementing the LBL MaCH3 analysis which promises better scaling for including more systematic effects.

Comments:

The LBNC appreciates the collaboration's efforts towards atmospheric neutrino analyses. This topic (along with supernova neutrinos) should continue to be a priority, as this will be the main physics that DUNE will deliver before the beam comes online. At the same time, completing the full oscillation analysis including full simulation of ND+FD will be essential for future reports and reviews. It is therefore important to keep both types of analysis in focus.

Data enables a continuous stream of theses. Data taking with ProtoDUNE-HD and ProtoDUNE-VD, and with the 2x2 demonstrator in the NuMI beam will be critical to increase student training and growing expertise.

Completion of the full simulation and analysis of the ND should be a priority in preparation for the ND design reviews

Recommendations:

1. At the next LBNC meeting, the collaboration should provide an update on the status and timeline for the completion of a full ND simulation and its inclusion in the oscillation analysis.

Appendix I: Attendees

Committee: Bortoletto, Campana, Champion, Delmastro, Forti, Gottberg, Gouvea, Kopp, Para, Petyt (incoming member), Resignco, Rumerio, Rusu, Saoulidou, Vachon

Apologies: Wallny

Scientific Secretary: Joseph Zennamo

Fermilab PAC Chair: Hiro Tanaka

Fermilab NSG Chair: Dmitri Denisov

DUNE/LBNF (please see registrants at https://agenda.infn.it/event/39443/)

FNAL Directorate/Management: Bonnie Fleming , Steve Brice

Appendix II:

Charge Letter: LBNC February 2024 Review, February 26-28, 2024

The LBNC is charged by the Fermilab Director to provide external scientific peer review and to monitor the technical progress of the International DUNE collaboration, and those aspects of the facility construction that have direct impact on the DUNE experiment.

For the February 2024 meeting, the LBNC will meet to review the status and progress of LBNF and DUNE. As with other meetings, the LBNC should construct a report in which it acknowledges, comments on, and where appropriate, makes recommendations following the presentations and discussions during the meeting.

There are two major topics for this LBNC meeting: the LBNF beamline and DUNE computing. The DUNE near detector will be a secondary focus. In addition, the LBNC should receive updates on the DUNE collaboration, far detector progress, activities towards ProtoDUNE-II, and DUNE Phase II.

In considering the presentations and material provided for the meeting, attention should be given to prior LBNC recommendations and actions that have been undertaken to address these recommendations. We would like to continue our work toward uniform and regular reporting and tracking of major DUNE technical milestones.

For the LBNF beamline topic the committee is asked to:

1) Give initial impressions of the LBNF beamline TDR. Please comment on its scope and completeness, and whether the level of detail is appropriate for a CD 2/3 review.

It is anticipated that the LBNC will spend a couple of months conducting a document review of the LBNF beamline TDR to ensure its readiness for a CD2/3 review in the summer. The approach will be similar to the reviews of the two far detector TDRs last year. A presentation on the TDR will be given in this February meeting and the actual TDR document should be ready on the same timescale.

For the DUNE computing topic the committee is asked to:

2) Comment on the organizational structure.
    a. Is it appropriate for the task?
    b. Are there the right relationships with external stakeholders?
    c. Is there any advice the committee has?
3) Comment on the plan to develop a core software framework for the experiment.
    a. Is the plan achievable?
    b. Is the timeline of the plan appropriate?
    c. Will the resulting framework be appropriate to the task?
    d. Is there any advice the committee has?
4) Comment on the readiness of DUNE computing for ProtoDUNE II data
5) Comment on the mapping between the stated computing requirements and the physics needs of the experiment

The LBNC should present a Closeout Report to deliver at the end of the meeting. Subsequently this should be refined into a LBNC Meeting report.

Appendix III: Assignments

Plenaries

LBNF Status
Gottberg, Champion

DUNE Status
Vachon, Bortoletto**,** Gouvea

FD-VD: Overall status, progress and plans
Forti, Resignco, Para

FD-HD: Overall status, progress and plans
Rumerio, Delmastro, Wallny

Phase II: Status and plans
FD-VD, FD-HD, ND sub-groups

Near Detector for Phase I: Overall status, progress and plans
Kopp, Forti, Resignco**,** Wallny

Computing: Status and plans
Rusu, Campana, Delmastro

Status and Plans of ProtoDUNE HD2 and VD
FD-VD, FD-HD, ND sub-groups

DUNE & ProtoDUNE Physics Program: Overview, progress and plans
Bortoletto, Gouvea, Kopp, Vachon

Breakouts

Beamline Status & Progress
Gottberg, Champion

Near Detector Status, Progress and Plans including ND-LAr 2x2 Demonstrator
Kopp, Forti, Resignco**,** Wallny

Computing Status, Progress and Plans
Rusu, Campana, Delmastro