

# ND-LAr PDR

<https://indico.fnal.gov/event/54919>

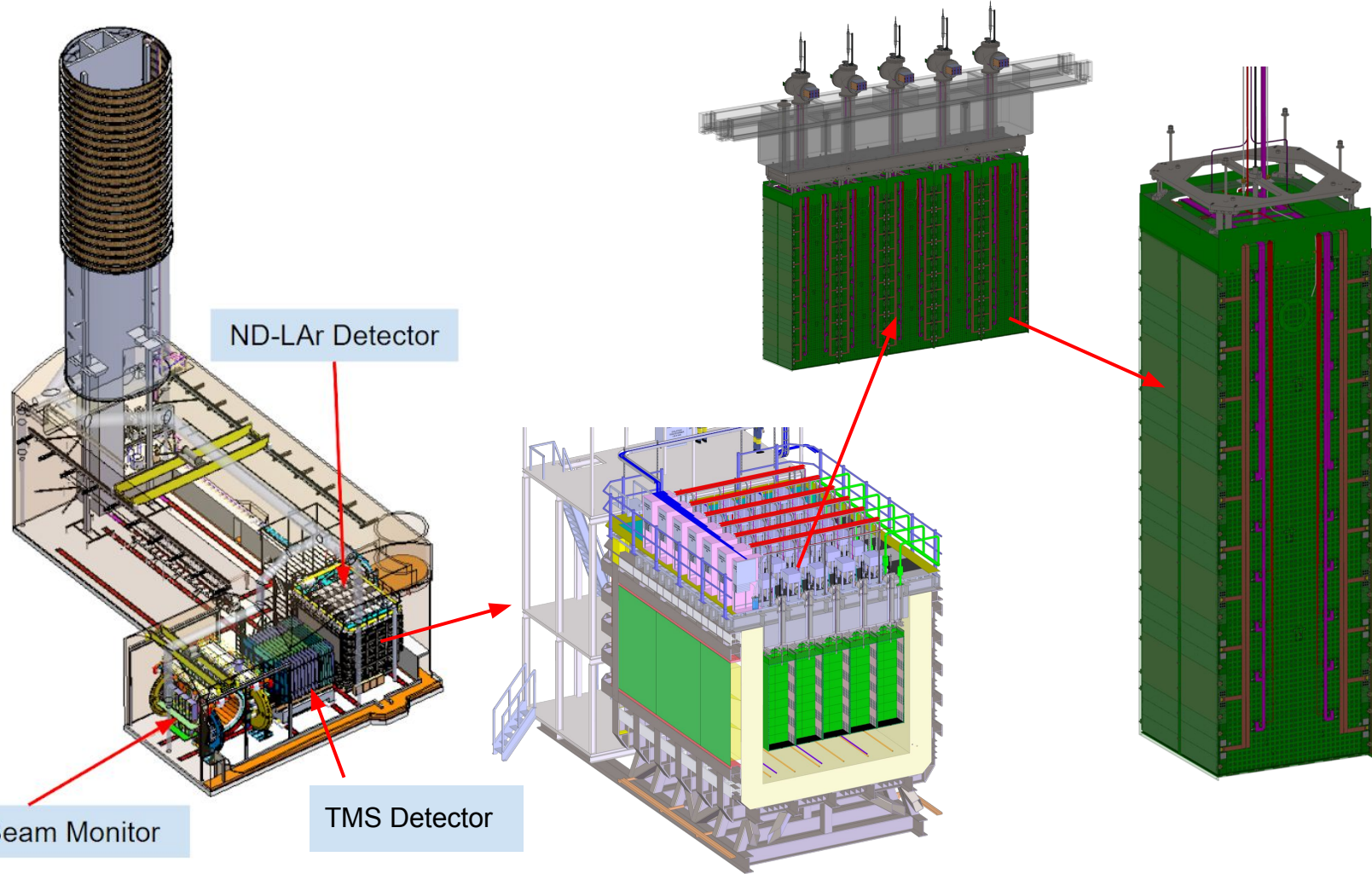
June 27-28-29, 2022

M. Weber, Lead

D. Dwyer, Technical Lead

I. Kreslo, Detector Systems Lead

A. Lambert, Lead Engineer



# Timeline

- R&D Completed in 2019

- Prototyping phase

- “Cube” 2020

- CDR completed 2020

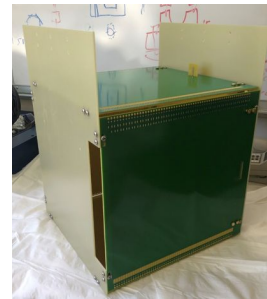
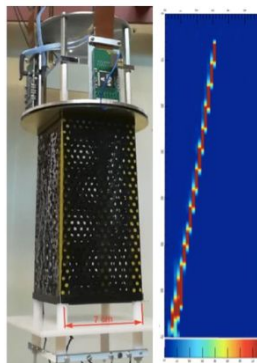
<https://arxiv.org/abs/2103.13910>

- 2x2 Module-0 April 2021

- **PDR June 2022**

Documentation in EDMS:

<https://edms.cern.ch/ui/#!/master/navigator/document?D:100919628:100919628:subDocs>



# Preliminary Design Review deliverables

From <https://edms.cern.ch/document/2173197>

- Design choice identified
- Design in accordance with detector requirements
- Detailed engineering drawings, schematics, models, interface drawings and preliminary parts list
- Interface documentation
- Engineering safety analysis plan and initial engineering analysis
- Preliminary installation and testing plans
- Incorporation of ProtoDUNE & other prototyping lessons learned
- Manufacturing methods and acquisition strategy
- Plans for production and evaluation of prototypes
- Draft manufacturing, quality assurance, testing and procurement plans
- Preliminary installation plans including special tools and fixtures
- Preliminary cost and schedule estimate
- Results of value engineering exercise
- Resolution of previous or relevant ProtoDUNE review recommendations

# “Dry-run” PDR May/June 2021

One day per subsystem

<https://indico.fnal.gov/event/48671/>

## **Module Mechanical Structures**

D. Montanari (Chair)

M.-J. Kim

J. Cherwinka

## **HV, Field Shaping system**

F. Pietropaolo (Chair)

L. Bagby

B. Yu

## **Charge Readout system**

M. Verzocchi (Chair)

N. Anfimov

F. Terranova

## **Light Readout system**

D. Warner (Chair)

J. Asaadi

M. Touns

## **Simulation, Reconstruction, Analysis**

F. Cavanna (Chair)

J. Nowak

E. Worcester

## **Calibration**

J. Maneira (Chair)

S. Gollapinni

## **Prototyping and test beam program**

S. Pordes (Chair)

A. Ereditato

K-B. Luk

## **Assembly, Testing, Integration and Installation**

J. Stewart (Chair A&T)

F. Matichard (Chair I&I)

H. Nelson

# Charge

1. Is there sufficient confidence that the preliminary design of ND-LAr will meet the technical requirements and performance specifications such that it achieves the primary goal of a LArTPC detector that performs comparably to DUNE FD in the high rate environment of DUNE ND?
2. Are interfaces adequately identified and documented at a level suitable for preliminary design, particularly with regard to:
  - a. Maintaining adequate reconstruction capabilities for muons exiting the ND-LAr active volume?
  - b. Installation and integration into the ND-LAr cryostat?
  - c. Cabling and detector motion with DUNE-PRISM?
  - d. Integration into the central data acquisition and slow controls?
3. Does the risk mitigation strategy suitably employ engineering and prototyping to address design challenges? In particular, does the prototyping plan leading to the construction and operation of a full scale module and the operation of multiple smaller modules in the “2x2” setup suitably address the major technical risks and inform the final design process?
4. Are codes and standards relating to engineering, ES&H, QA/QC suitably applied at this stage?
5. Is there adequate confidence on cost and schedule estimates to proceed to final design?
6. Have recommendations from previous reviews been adequately addressed and approved by the relevant authority?
7. Is the design maturity at a satisfactory level for this stage to recommend the ND-LAr Consortium to proceed to final design?

9:45 AM → 10:15 AM **Committee Executive Session**

30m

10:15 AM → 10:30 AM **Intro and Welcome**

15m

Speaker: Michele Weber (Bern)

10:30 AM → 11:00 AM **ND-LAr Overview**

30m

Speaker: Dan Dwyer (LBNL)

Dwyer\_NDLArOverv...

11:00 AM → 11:30 AM **Physics and Design Studies**

30m

Speakers: Andrew Mastbaum (Rutgers University), J. Pedro Ochoa (University of California at Irvine)

MastbaumOchoa....

11:30 AM → 12:00 PM **Systems Engineering and Management**

30m

Speaker: Andrew Lambert (LBNL)

Lambert Systems E...

12:00 PM → 12:15 PM

**Break**

15m

12:15 PM → 12:45 PM **Electrical System Overview**

30m

Speaker: Armin Karcher

Karcher\_ND LAr ele...

12:45 PM → 1:15 PM **Technology Status and Prototyping**

30m

Speaker: Igor Kreslo (LHEP, University of Bern)

Kreslo\_Technology...

1:15 PM → 2:15 PM **Module Structure**

1h

Speakers: Igor Kreslo (LHEP, University of Bern), Silas Bosco (LHEP, University of Bern)

Bosco\_ModuleStru...

Kreslo\_ModuleStru...

2:15 PM → 2:30 PM

**Break**

15m

2:30 PM → 3:00 PM **Committee Executive Session**

30m

**10:00 AM** → 10:15 AM **Responses to Questions**

⌚ 15m

**10:15 AM** → 11:00 AM **High Voltage**

⌚ 45m

**Speaker:** Saba Parsa (University of Bern)

Parsa\_HV\_Design...

Parsa\_HV\_Overvie...

**11:00 AM** → 12:00 PM **Light Readout**

⌚ 1h

**Speakers:** Alexandr Selyunin (JINR), Nikolay Anfimov (JINR), Nikolay Anfimov

Anfimov\_LightRead...

Selyunin\_LightRead...

**12:00 PM** → 12:15 PM**Break**

⌚ 15m

**12:15 PM** → 1:15 PM **Charge Readout**

⌚ 1h

**Speakers:** Armin Karcher, Brooke Russell (LBNL)

Karcher\_Charge Re...

Russell\_ChargeRea...

**1:15 PM** → 2:15 PM **Field Structures**

⌚ 1h

**Speakers:** James Sinclair (SLAC National Accelerator Laboratory), Knut Skarpaas (SLAC)

Sinclair\_FieldStruct...

Skarpaas\_\_FieldSt...

**2:15 PM** → 2:30 PM**Break**

⌚ 15m

**2:30 PM** → 3:30 PM **Calibration**

⌚ 1h

**Speakers:** Jelena Maricic (University of Hawaii), Kendall Mahn (Michigan State University), Morgan Bonnet (U-Hawaii Manoa)

BONNET\_Calib\_Me...

Maricic\_Calibration...

**3:30 PM** → 4:00 PM **Committee Executive Session**

⌚ 30m





**10:00 AM** → 10:15 AM **Responses to Questions**

⌚ 15m

**10:15 AM** → 11:45 AM **Assembly and Testing** ¶

⌚ 1h 30m

**Speakers:** John Jablonski (Colorado State University), Louise Suter (FNAL), Michael Mooney (Colorado State University) Jablonski\_TPC Ass... Mooney\_Assembly... Suter\_Assembly...**11:45 AM** → 12:00 PM**Break**

⌚ 15m

**12:00 PM** → 1:00 PM **Integration and Installation**

⌚ 1h

**Speaker:** Andrew Lambert (LBNL) Lambert TPC Integ...**1:00 PM** → 1:15 PM**Break**

⌚ 15m

**1:15 PM** → 2:15 PM **Path to FDR: Design, Prototyping, and Technology Maturation**

⌚ 1h

**Speaker:** Michele Weber (Bern) Weber\_DesignDeve...**2:15 PM** → 2:30 PM **Conclusion**

⌚ 15m

**Speakers:** Dan Dwyer (LBNL), Michele Weber (Bern)**2:30 PM** → 3:00 PM **Committee Executive Session**

⌚ 30m

