DUNE ND-LAr Institute Board

27. March 2021

Agenda

- Update on Total Cost Estimate for LAr-ND
  being discussed with funding agencies
- Progress on MOU Definitions and potential resources
- General Consortium Schedule and Review Update
- 2x2 Commissioning and Run Plan /Potential FNAL Visit schedule

Funding update

- Russia: LCM light system

- Update from Switzerland
  - Funded activities 2021 and 2022 (prototyping)
  - Decision on construction funds in early 2023 (with MoU)

  ⇒ need MoUs

- Updates from US
  - CD1RR, new baseline
  - **Proposal** with increased the overall funds to ND-LAr (+65%)
  - Prioritized list of contributions
    - Limit calibration
    - Limit LAr testing of each module

  ⇒ Pros: Significant increase in US support for ND-LAr. Puts system on more solid footing

  ⇒ Cons: Incompatible with current consortium plan for Calibration and LAr QC testing

Scope

131.02.03.02.01	Module Structure
131.02.03.02.02	HV
131.02.03.02.03	Field Structures
131.02.03.02.04	Charge Readout
131.02.03.02.05	Light Readout
131.02.03.02.06	Calibration
131.02.03.02.07	TPC Module Assembly & Testing
131.02.03.02.08	TPC Installation & Integration
131.02.03.02.09	ND LArTPC Management
131.02.03.02.10	Module Assembly & Test Facility @ FNAL
131.02.03.02.11	Full-scale Demonstrator Test Facility @ SLAC
131.02.03.02.12	2x2 Neutrino Beam Test @ FNAL
131.02.03.02.13	ArgonCube Test Facility @ Bern

MoUs

- DUNE wide MoUs will define participation in the experiment
- There will be Annexes for consortia, e.g. ND-LAr

The annex for the ND-LAr will define:

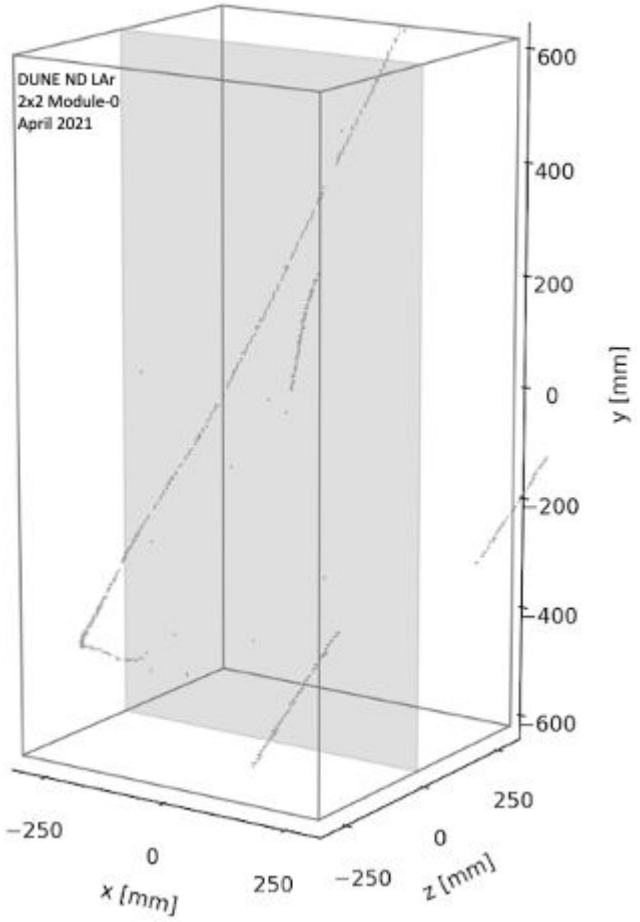
- Scope / deliverables
- Which institution provides which item (or funds via funding agencies)
- Which institution contributes to which item

One annex listing all institutions, NOT on an institution-by-institution base

Proposal to add an upstream spectrometer (talk at the last IB): no decision yet

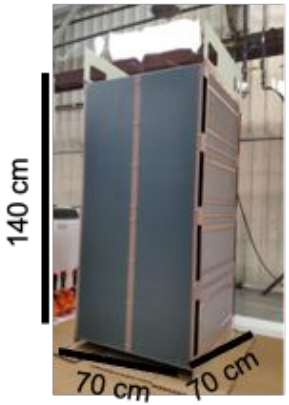
Prototyping

Very successful so far: thank you to everyone !

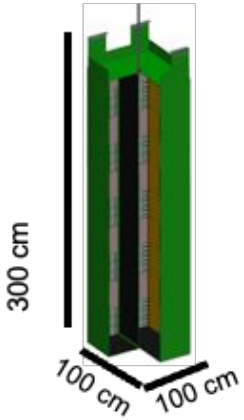


2019-2021

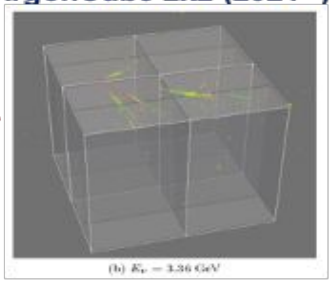
Module 0
SingleCube,
then 1 module (Module 0),
then 4 modules (2x2)
Operated in cryostat at Bern,
then FNAL in NuMI beam



2022-2023
Full-scale ND Demonstrator



ArgonCube 2x2 (2021--)



2024-2026
Production and testing

1 production
'first article'

35 (+5) Production modules
Each fully tested in single-module cryostat

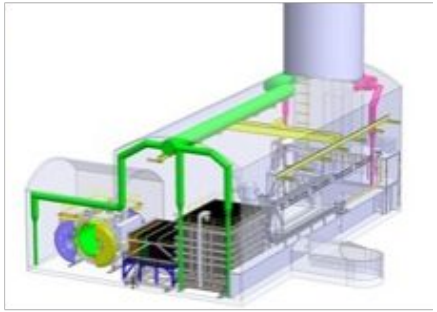
Deliverable: modules packed and ready for installation underground

Test at MATF @ FNAL

2027-2029
Installation

Support of TPC module installation in Near Site

Activity driven by Near Site Integration (NSI)



General schedule

April Module-0 run in Bern 
May 2021 internal detector systems review “readiness for PDR/TDR”

PDR/TDR in calendar Q4/2021

2x2 @NuMI runs 22-23
Full size demonstrator 2023

FDR in calendar Q2/3 2023

- PRR in calendar ~ Q1 2024

Slide from the pre-PDR review

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

- Completed R&D 2019
- In the prototyping phase
  - “Cube” 2020
  - 2x2 Module-0 April 2021
  - Upcoming in the next ~2 years: Full-Size Module and 2x2 neutrino beam tests
- DUNE reviews (https://edms.cern.ch/document/2173197):
  - CDR (completed 2021), see https://arxiv.org/abs/2103.13910
  - PDR
  - Procurement Readiness
  - FDR (late 2023), PRR (early 2024), IRR, ORR (this line by the review office)

- ND-LAr plans to have the PDR in calendar Q4 2021:
  - Main prototyping stage is the Module-0 run
  - Are we on a reasonable course?

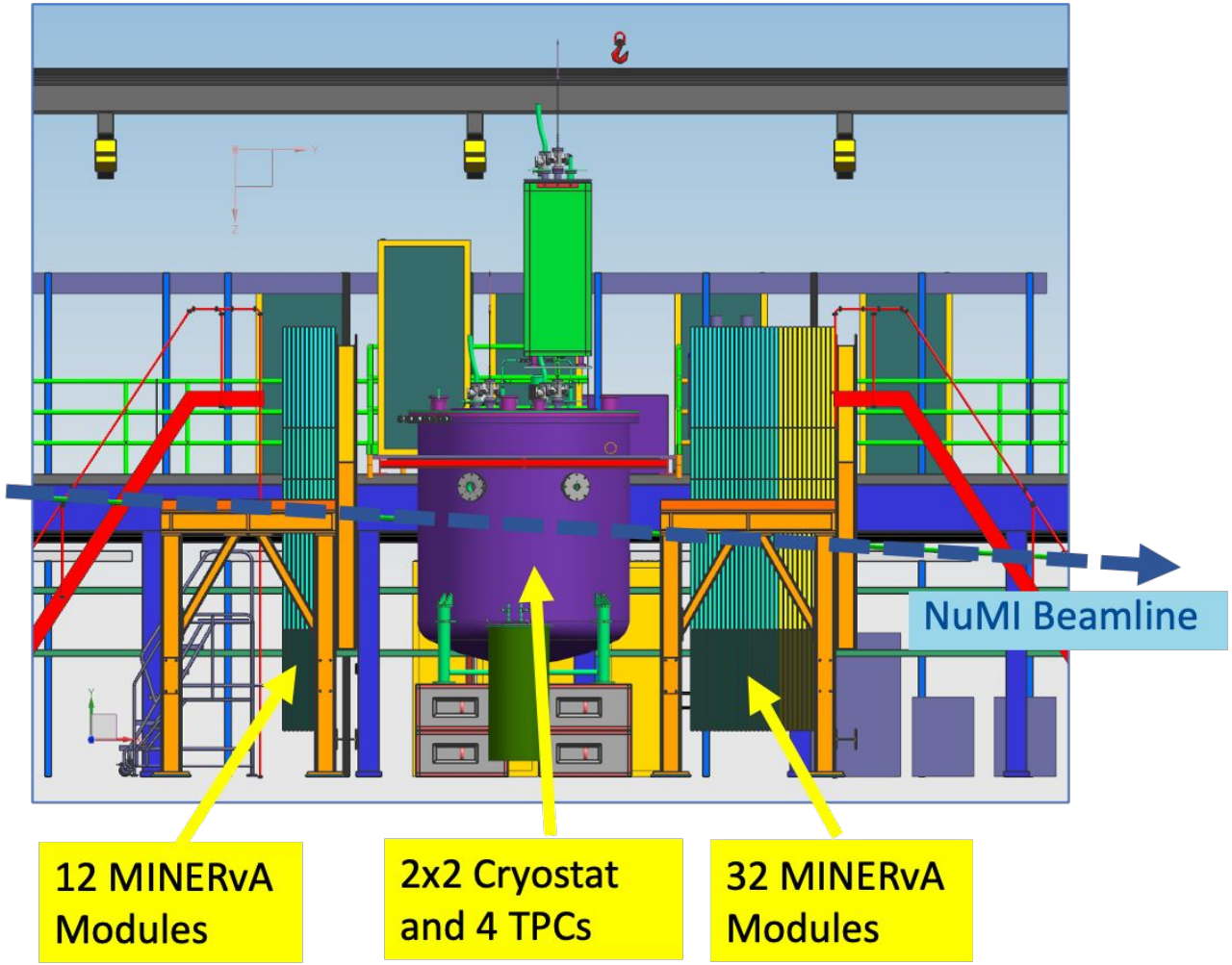
- See charge: Charge_ ND-LAr Internal Subsystems review.pdf

2x2

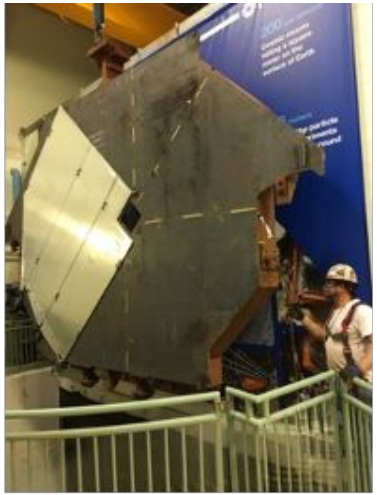
- Target the start of neutrino beam operation underground at NuMI in October/November 2022 (start of neutrino beam in Fall 2022)
- Setup and cryogenic/readout test at LArTF in 2021
  - 2x2 cryostat will be shipped in two weeks
  - Module-0 to be shipped in Summer
  - Preparations for cryo, slow-control, readout, …
- Build 3 more module by the end of 2021 (Bern)

- Update at the FNAL PAC on June 9th

- **Plan for personnel @FNAL in 2021 from consortium: starting end of Summer (or when COVID rules allow it...)**

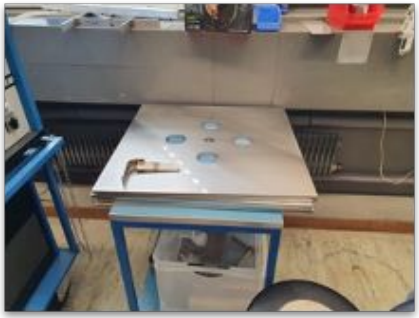

NuMI Beamline
12 MINERvA Modules
2x2 Cryostat and 4 TPCs
32 MINERvA Modules

MINOS decommissioning progressing well

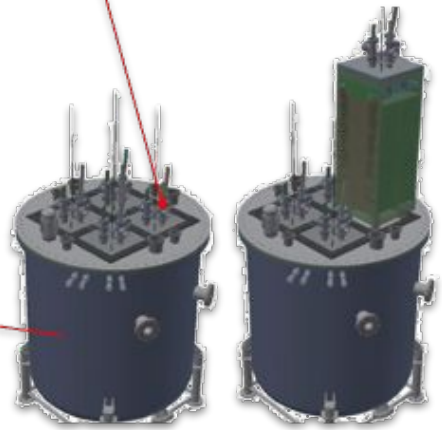


Cryostat being prepared for shipping

4 x top vacuum pockets being welded:
seal of the cryostat



Cryostat:



May be shipped by the PAC meeting