

# Phase-II Document Overview & Plans

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Phase-II General Meeting

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# Phase-II Document

- Overleaf link
  - <https://www.overleaf.com/project/64426ba2e3ef1424cdcd25e1>
  - All of the co-authors should have the editable link, if not, let us know
- Current Organization
  - Introduction/Overview
  - Physics
  - FD
  - ND
  - Summary
- Suggestions/thoughts welcome on any other key content missing

Phase II of DUNE	
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# Document Goal

- A CDR-lite style document that summarizes the FD/ND Phase-II scientific opportunities, physics scope, and detector concepts/technologies, R&D roadmap along with detector options and integration plan
- Plan to put on arXiv as a public document and possibly publish (e.g. JINST, Instruments)— a public document will likely be helpful to those doing active R&D as a reference for funding agencies
- In the future, as FD and ND options are finalized, will become a basis for producing CDR documents

# Phase-II FD

- Many technologies under consideration for FD3 & FD4 with active R&D
  - SoLAr, ARIADNE, LArPix, Q-Pix, APEX, WbLS etc.
  - A bulk of these are focused on upgraded photon detector and charge readout systems along with integrated charge-readout
- As you write your sections for each technology, make sure to include
  - What physics does the technology enable?
  - Detector specifications (driven by physics requirements)
  - If it is an upgrade, highlight what is new/novel technically
  - Current status, prototyping plans
  - A timeline and R&D roadmap towards full demonstration
  - Integration prospects: can your technology be combined with others, if so, discuss those prospects, advantages etc.

# Phase-II FD

- We should also include discussion on generic LArTPC R&D needed for the planned Phase-II technologies to enable new/extended physics reach (lower energy thresholds, very low background physics etc.)
  - What Calibration improvements should we consider?
  - Upgrades to DAQ, HV?
  - Could be separate for each technology but probably better if it is one generic section (one for FD and one for ND)? Thoughts?
- Two sections on bringing the FD3/4 plans together with detector options, R&D roadmap etc.

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3.6	R&D Roadmap (Stefan, Michel, Sowjanya)	21

# Phase-II ND

- Will include ND-GAr and also potential improvements (if any) to ND-LAr/SAND
- One section bringing together ND Phase-II Timelines, R&D and engineering road map
- A couple of items to consider including
  - If one of the FD options is non-LAr e.g. WbLS, how would that impact ND Phase-II plans?
  - Opportunities to use ND demonstrators to test FD3/4 technologies?

<b>4</b>	<b>The DUNE Phase II Near Detector</b>
4.1	Phase II Improved Tracker Concept . . .
4.1.1	TPC Charge Readout . . . . .
4.1.2	Calorimeter . . . . .
4.1.3	Muon System . . . . .
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4.1.5	Light Detection Options . . . . .
4.1.6	Other ND considerations . . . . .
4.2	Phase II Improvements to ND-LAr . . .
4.3	Phase II Improvements to SAND . . .
4.4	R&D and Engineering Road Map . . .

# First Draft Deadline

- Goal to produce a decent first version of the document by **mid-November**
- We started the document in April 2023; 6 months down the road, there is still a lot to do — ***we really need to finish this soon***
- Continue writing and let us know if you are having any issues

Phase II of the DUNE Experiment: Scientific  
Opportunities, Detector Concepts and Technological  
Challenges

The DUNE Collaboration

April 2023