

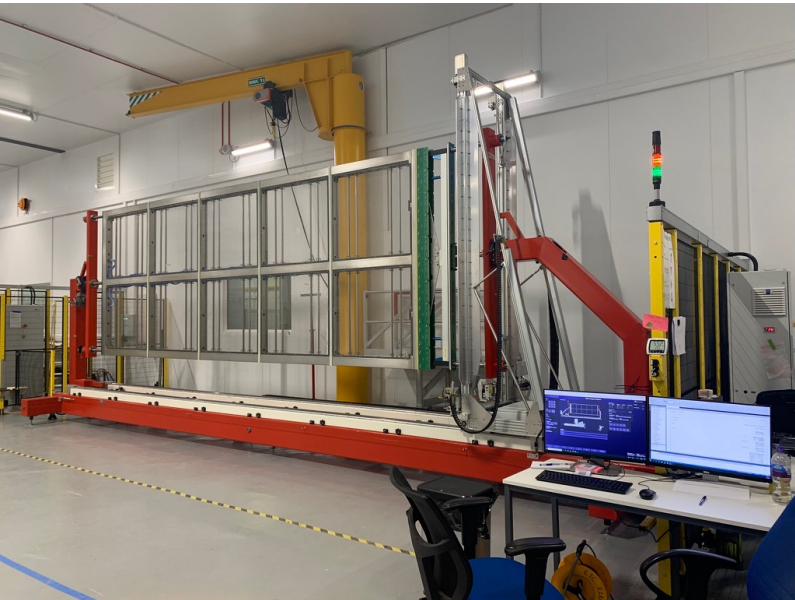
DUNE Update

Christos Touramanis

Liverpool PP Annual Meeting

18 May 2023

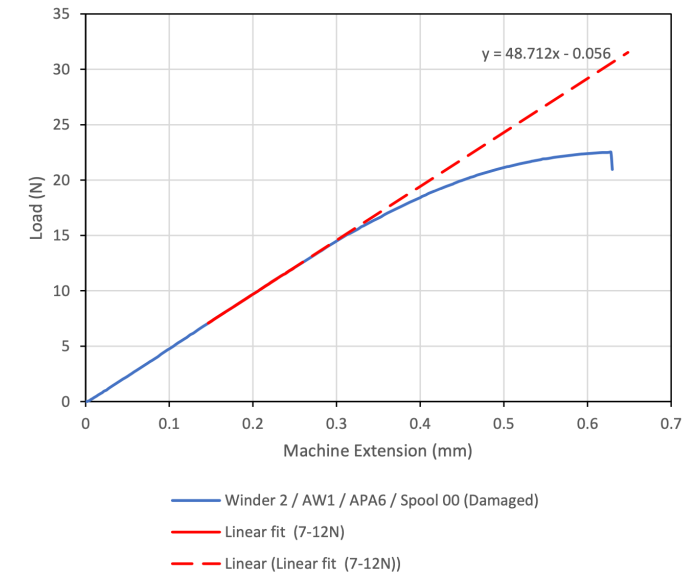
ProtoDUNE II



Outline

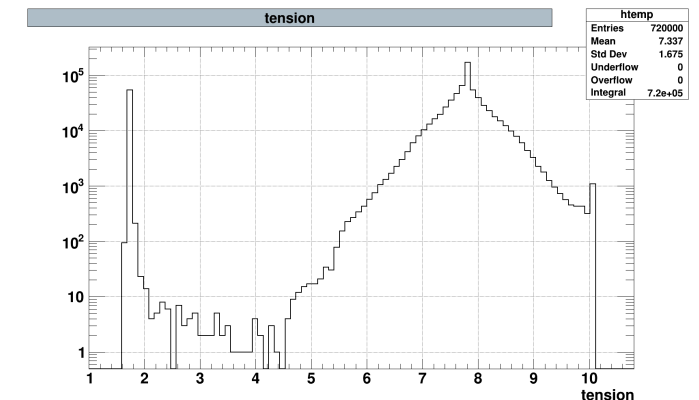
- DUNE progress and plans
- UK project update
- Liverpool contributions
 - Frames production (**John** Carroll)
 - Surveys (**Dave** Payne, **George** Stavrakis, **Krish** Majumdar)
 - Winder heads (Workshop, **Mark** Whitley, **Dave** Simm)
 - Wire tensions (**Carlos** Chavez, **Tim** Jones)
 - Daresbury factory management (Carlos Chavez)
 - Daresbury production (Dave Simm, **Tony** Gatling)
 - CERN tests (**C.T.**, **Matt** Brown)
 - Database (Krish Majumdar)
 - DAQ (**Marco** Roda)
 - Phase II technologies (**Kostas** Mavrokoridis and team)

Winder 2 / AW1 / APA6 / Spool 00 (Damaged) /
Sample 2

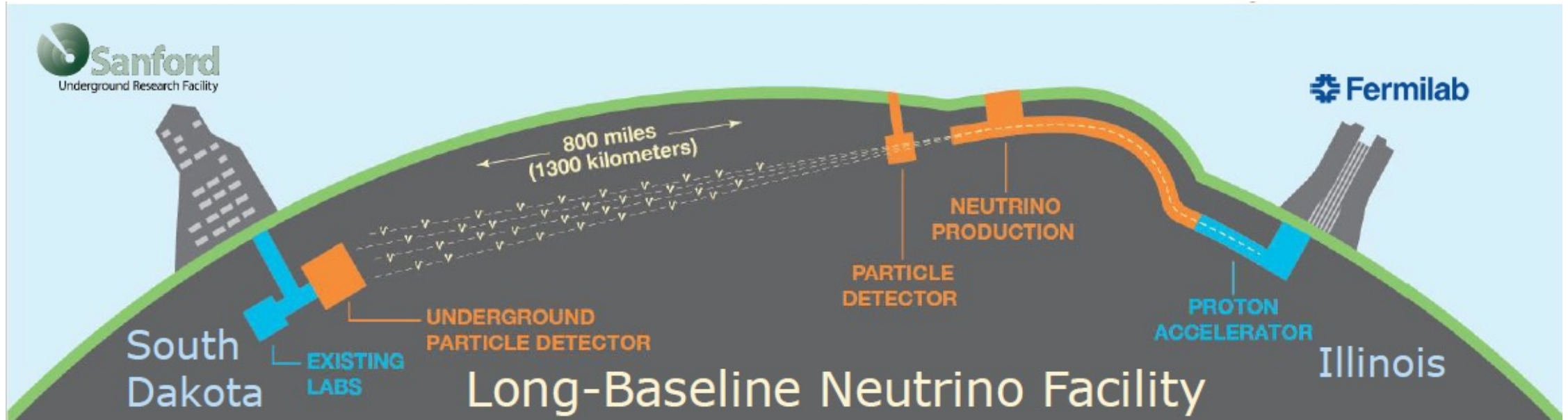


Wire characterization, Tim Jones

Winder tensions, Carlos



LBNF/DUNE project

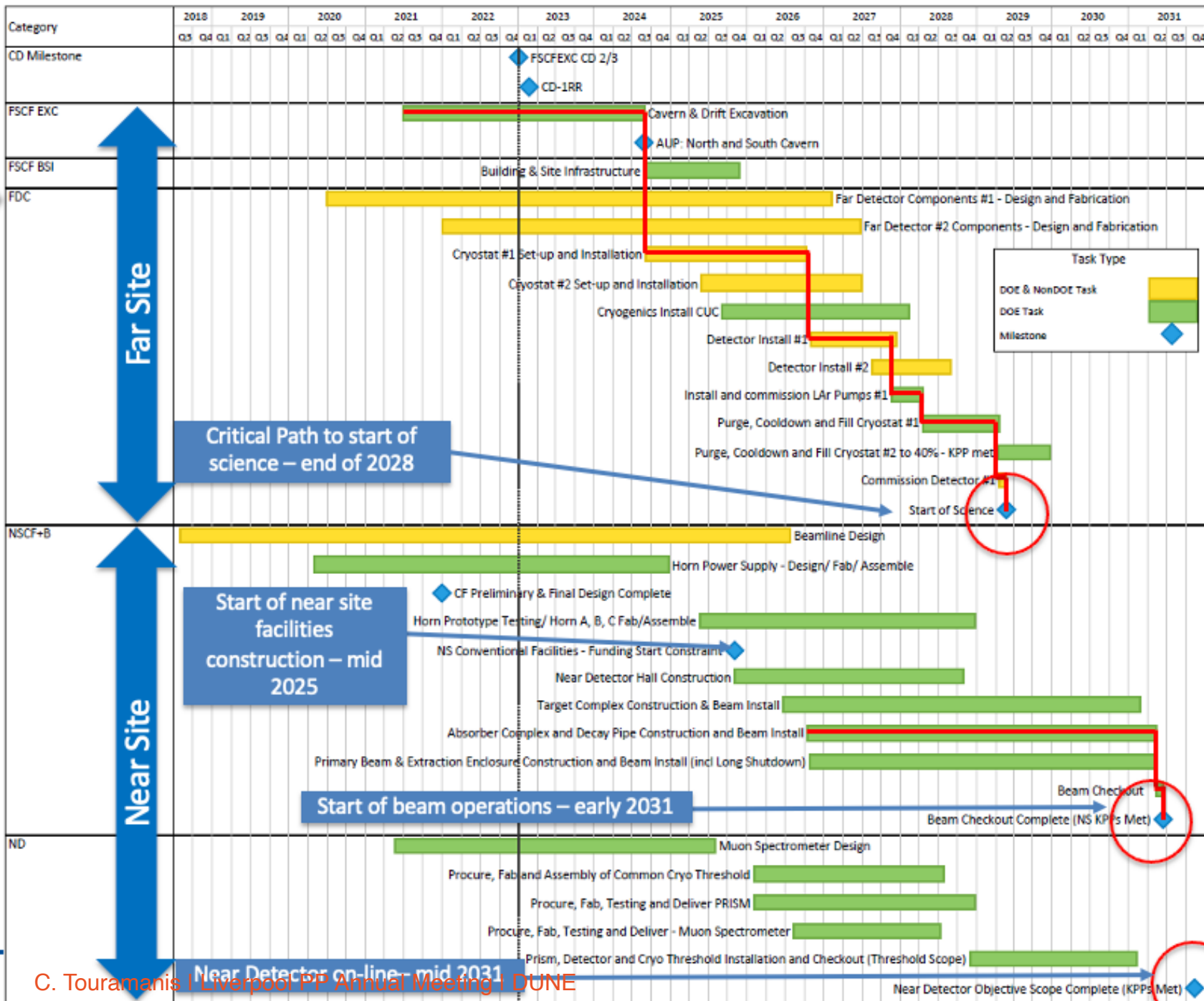


- LBNF: DOE project with international partners
- DUNE: international collaboration, science, Near Detector, Far Detectors
- Beam: PIP-II project separately funded and managed by Fermilab

LBNF/DUNE on a slide

	Subproj Abbrev	Subproject Title	Subproject Scope	Final Design Maturity	CD-2/3 IPR
FAR SITE	FSCF-EXC	Far Site Conventional Facilities - Excavation	All Far Site (FS) conventional facilities (CF) reliability, pre-excavation, and excavation including all detector caverns	100%	✓ Completed Jan 2022
	FSCF-BSI	Far Site Conventional Facilities – Building & Site Infrastructure	All Far Site (FS) conventional facilities (CF) support infrastructure	100%	✓ Completed Nov 2022
	FDC	Far Detector 1, Far Detector 2 + Cryogenics	Far Detector 1 (FD1), Far Detector 2 (FD2), including integration/installation, and all cryogenic infrastructure (C) and LAr fluids.	92% (FD1) 91% (FD2) 90% (C)	Scheduled Sep 2023
NEAR SITE	NSCF+B	Near Site Conventional Facilities + Beamline	All Near Site (NS) conventional facilities (CF) including beamline facilities, detector cavern and support infrastructure; primary and neutrino beamline (B)	100% (CF) 70% (BL)	Planned late 2023
	ND	Near Detector	Near Detector (ND) including integration/installation and cryogenic systems	42%	TBD 2024 to 2025

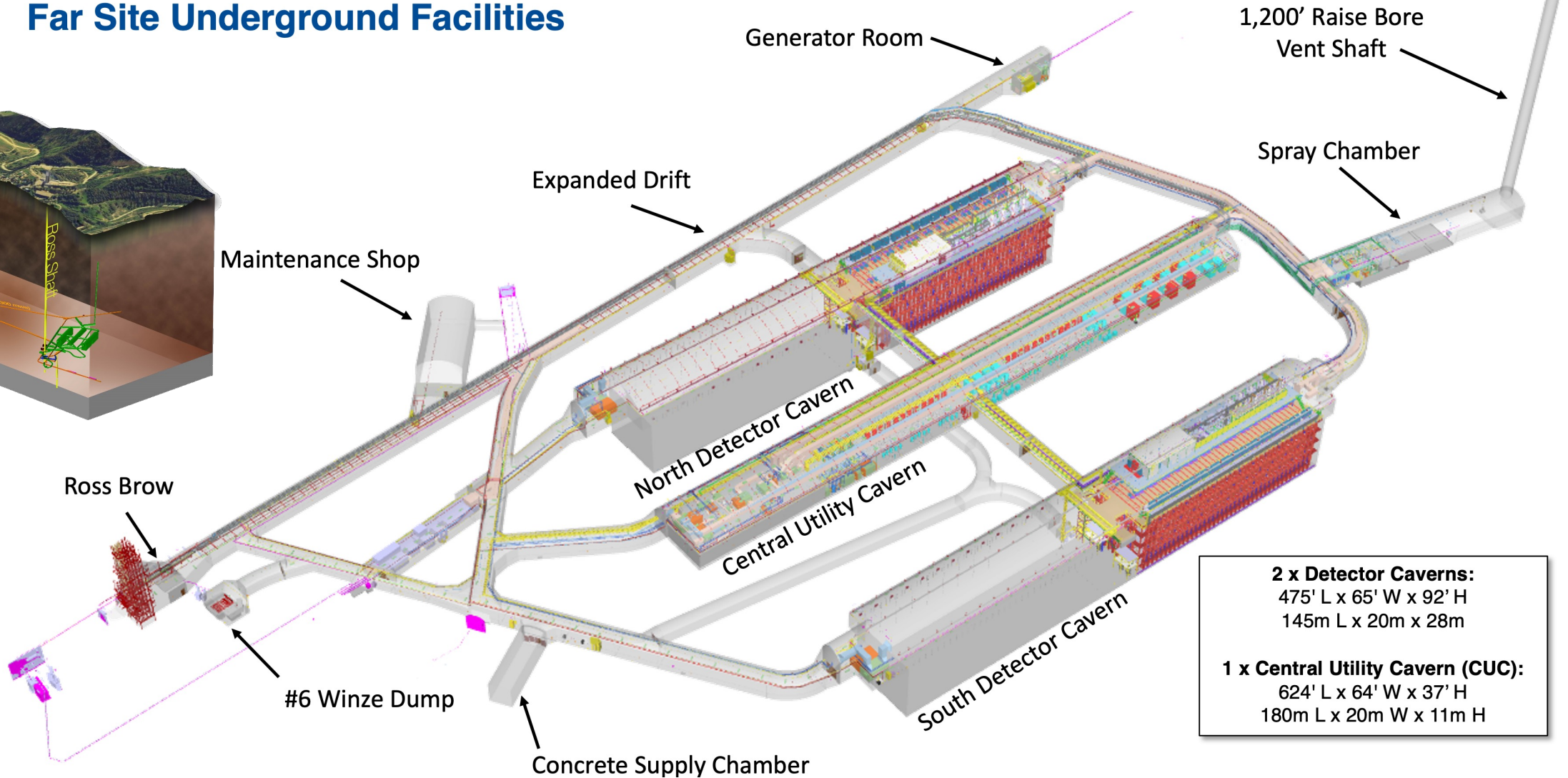
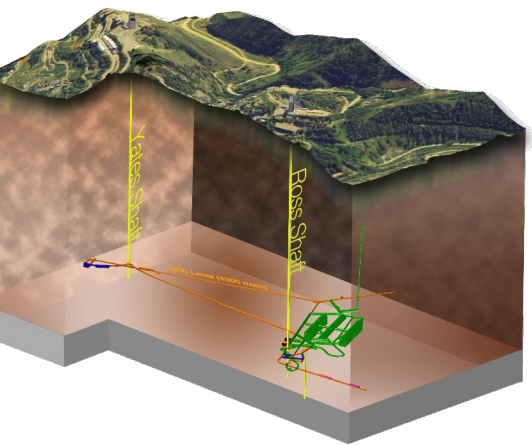
Summary Schedule with Critical Paths through Start of Science (FD1) and Beam-on



Favorable execution schedule enabled by new DOE funding profile in March 2022

- Notes:**
- Fiscal Year display
 - Early completion dates shown

Far Site Underground Facilities



2 x Detector Caverns:
 475' L x 65' W x 92' H
 145m L x 20m W x 28m

1 x Central Utility Cavern (CUC):
 624' L x 64' W x 37' H
 180m L x 20m W x 11m H

Excavation (800,000 tons of rock) 60% completed



DUNE: >1,500 members 354 in person attendance at CERN C.M., Jan. 2023

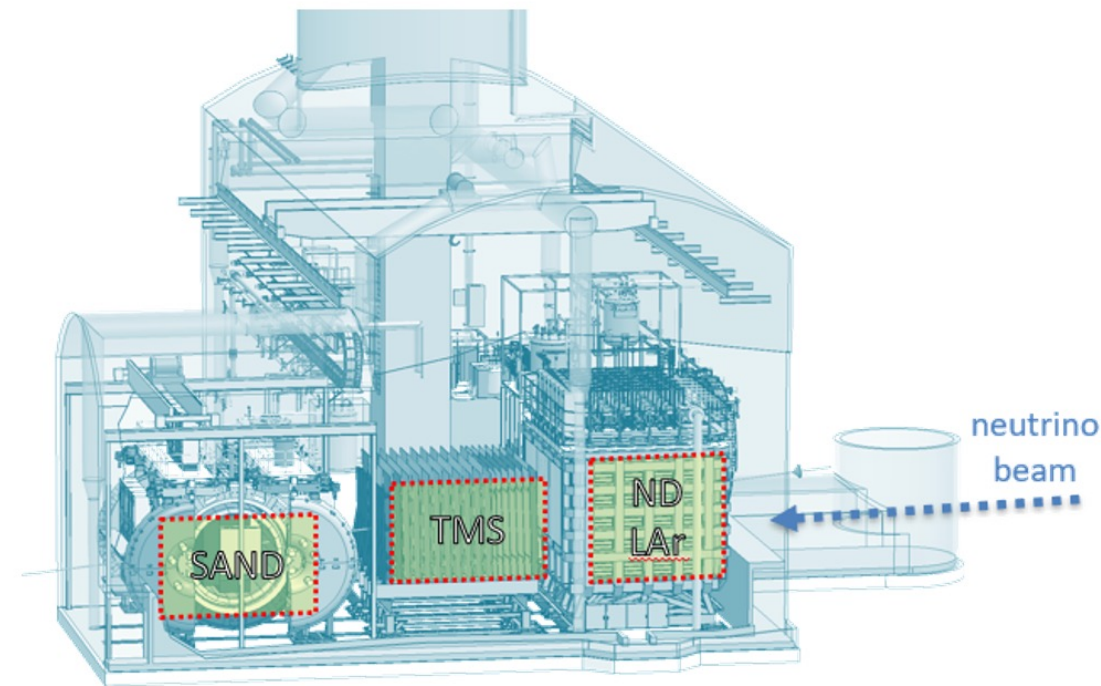


DUNE scope and plan

- Baseline (Phase I), under construction:

- Near Detector comprising ND-LAr, Muon Spectrometer, DUNE-PRISM capability, SAND (on-axis)
- FD1 (Horizontal Drift), FD2 (Vertical Drift)

Expected
by 2031

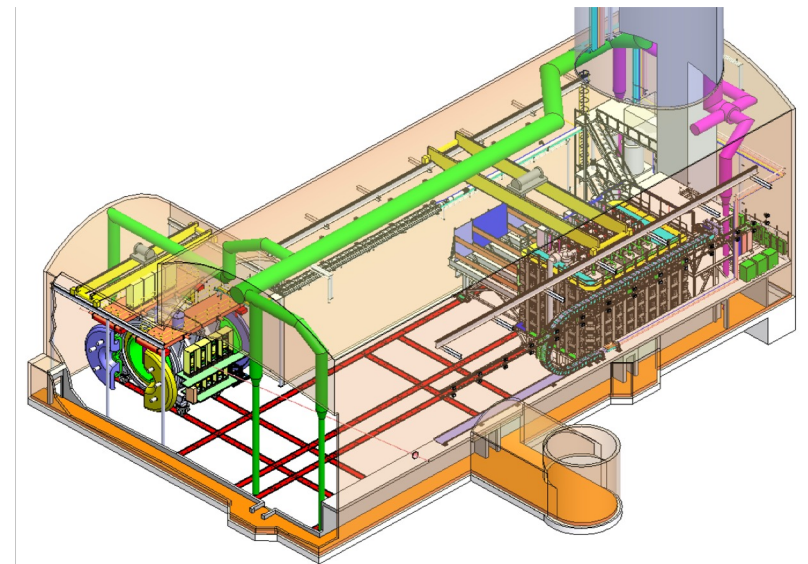


Baseline Near Detector

- Phase II, under discussion in P5:

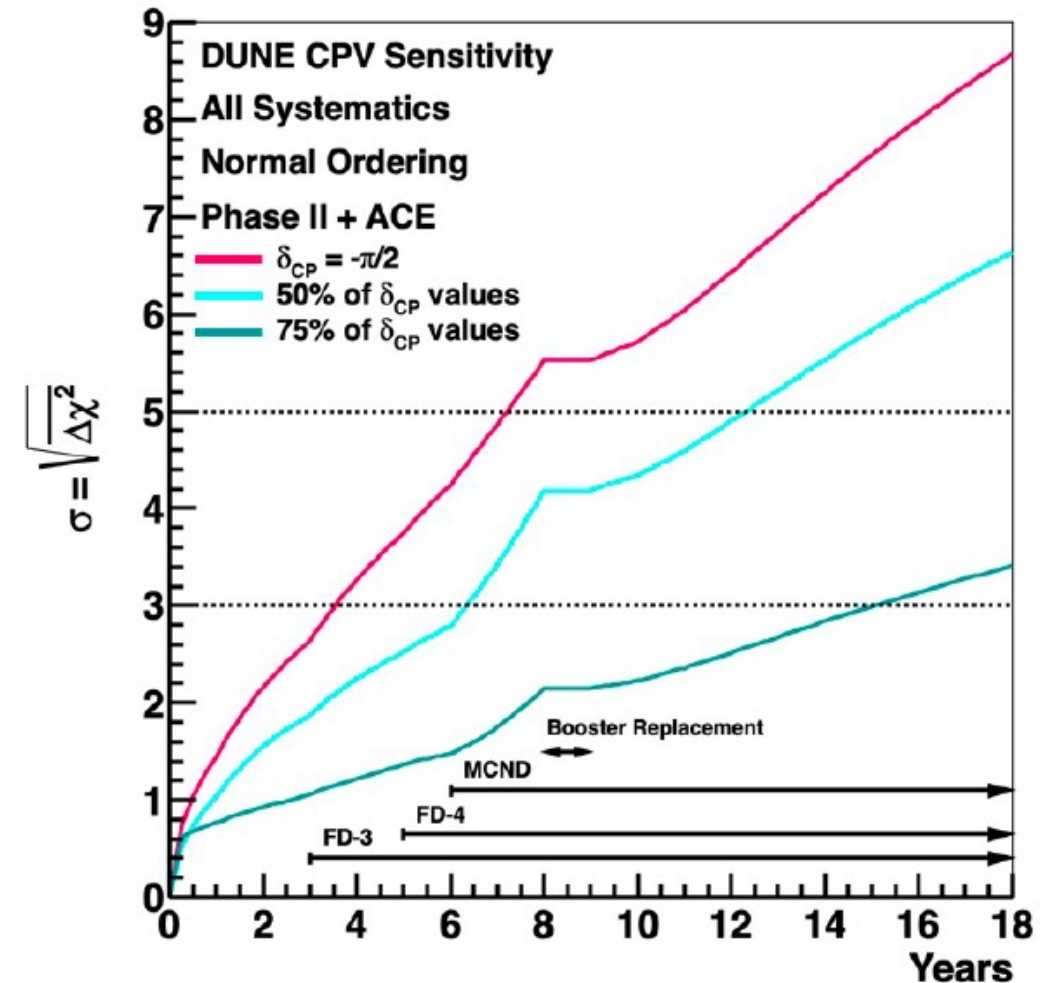
- FD3, FD4
- More Capable ND (GAr TPC)

Aim: by 2037



Beam power

- Standard Plan until 2022:
 - PIP II starting in 2031, ramping up to 1.2 MW (proton power) over 2-3 years
 - PIP III to reach 2.4 MW in second stage
- Recent development:
 - Accelerator Complex Evolution
 - Shorter Main Injector cycle time
 - Upgrade of target systems
 - Reliability improvements
 - Can provide >1.2 MW from 2031, up to 2.1 MW
 - Booster Replacement, 2.5 MW, long term



UK project news

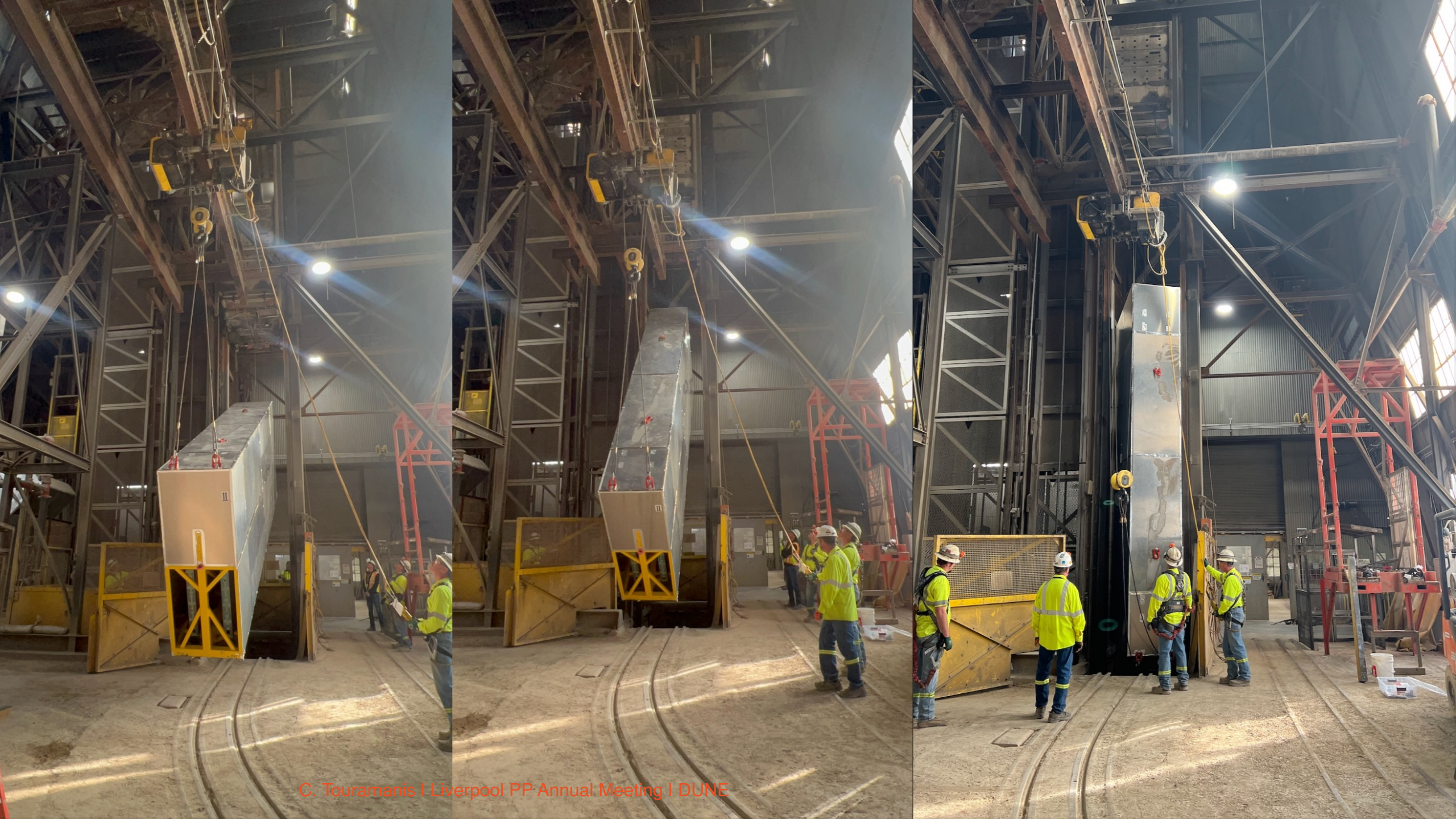
- DUNE-UK construction stage I completes in September 2023.
- Stage II was planned to be 3 years from October 2023.
- However DUNE delays and UK challenges push stage II to the period 04/24-09/27.
- APA, DAQ, Physics to operate as 3 individual projects (DUNE-UK).
- SFTC commits to deliver the APAs as top priority, and to provide support until we enter full exploitation in 2031.
- Bridging grants will be allocated to cover 10/23-03/24.

Daresbury Factory re-organization

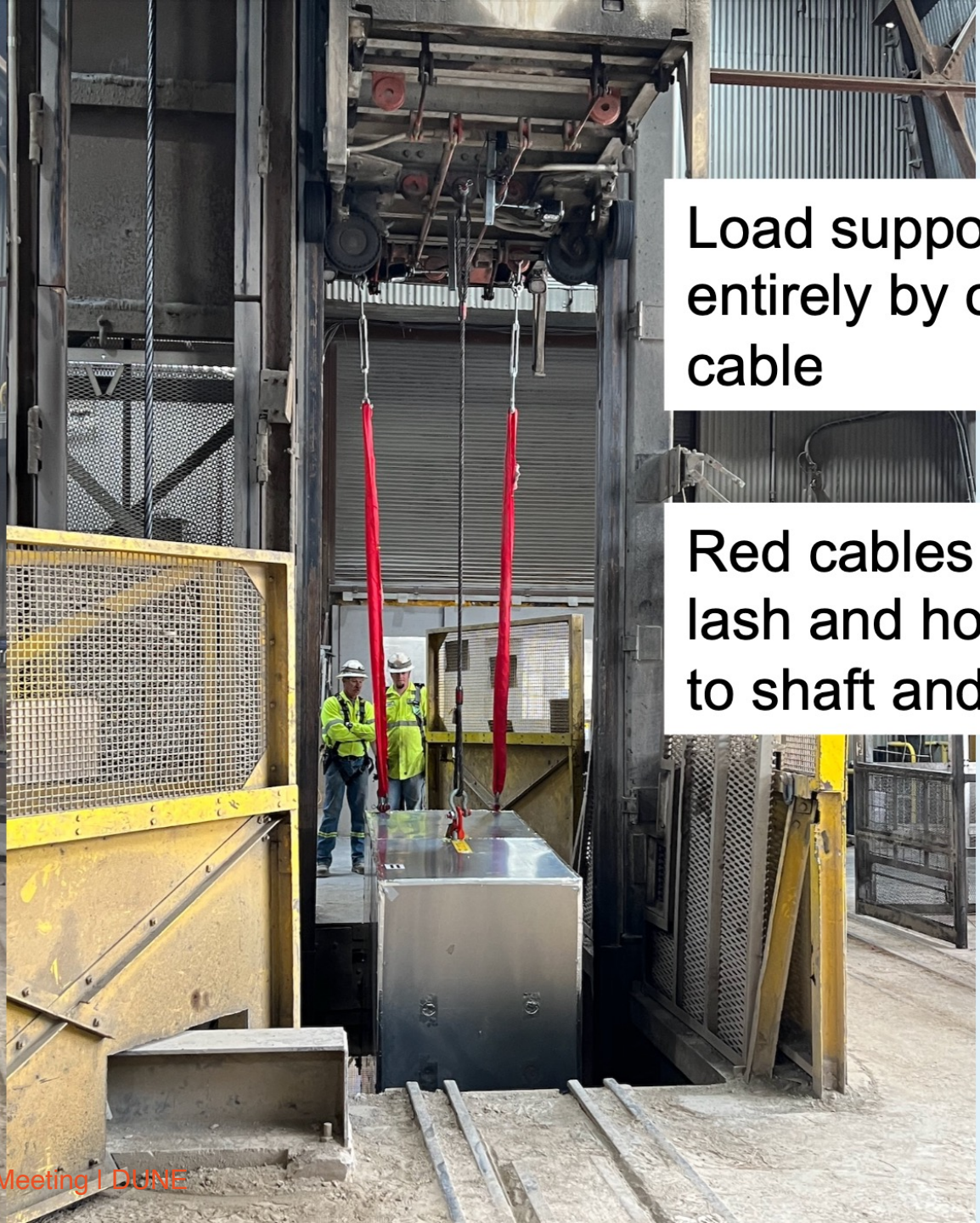
- Factory leadership and operations re-organized recently.
- Carlos becomes member of the management team, and takes charge of winders controls and improvements plan, for the duration of the production.
- New management team comprises manager from industry (Dave Smith), detector physicist lead (Sotiris Vlachos, Liverpool alumnus 😊), Carlos, Project Engineer (to be hired), staff manager (Peter Ratoff).
- Dave Simm and Tony Gatling very well appreciated for their skills and contributions, congratulations!
- APA production should be completed by Q2/27.

APA transport: first DUNE instrument underground at SURF!





C. Touramanis | Liverpool PP Annual Meeting | DUNE



Load supported entirely by central cable

Red cables there to lash and hold aligned to shaft and cage

Summary

- DUNE is doing excellent progress!
- Revised delivery plan and ACE for beam delivery important for timeliness and discovery potential.
- APA is the first DUNE detector system in production, and the first to deliver instruments underground!
- Liverpool leadership has been strengthened over the last year.
- Many thanks to all in the Department for their outstanding contributions!