

Project Status

Gary Barker

LBNF/DUNE UK Meeting, Bristol
June 2023

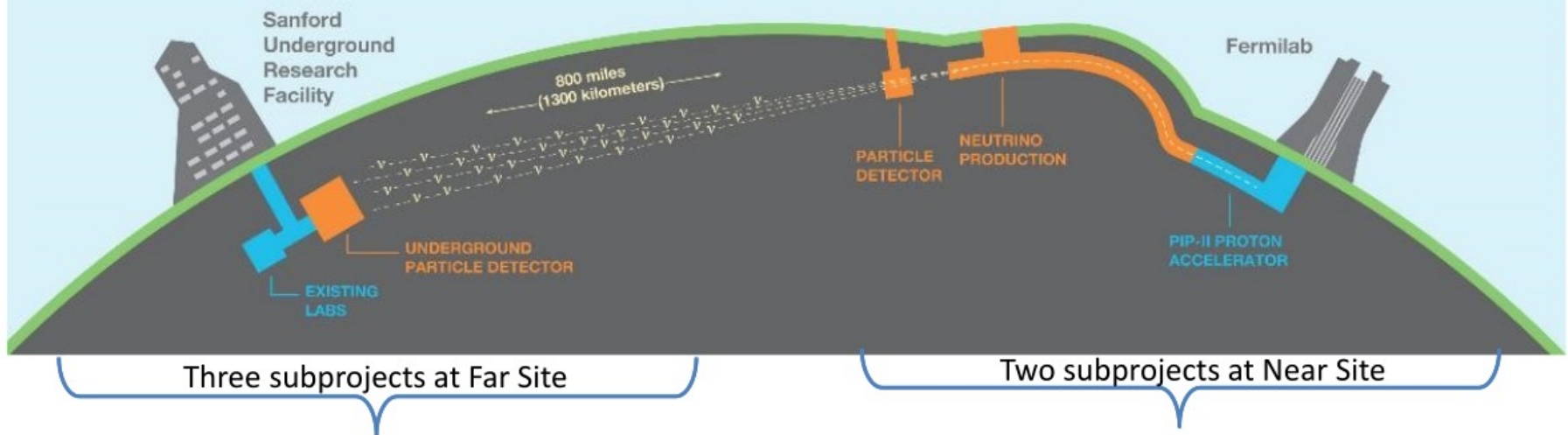
International Project Scope

Far Site – SURF in Lead, SD

Facility/Infrastructure and Far Detectors

Near Site – FNAL in Batavia, IL

Facility/Infrastructure, Neutrino Beamline, and Near Detectors



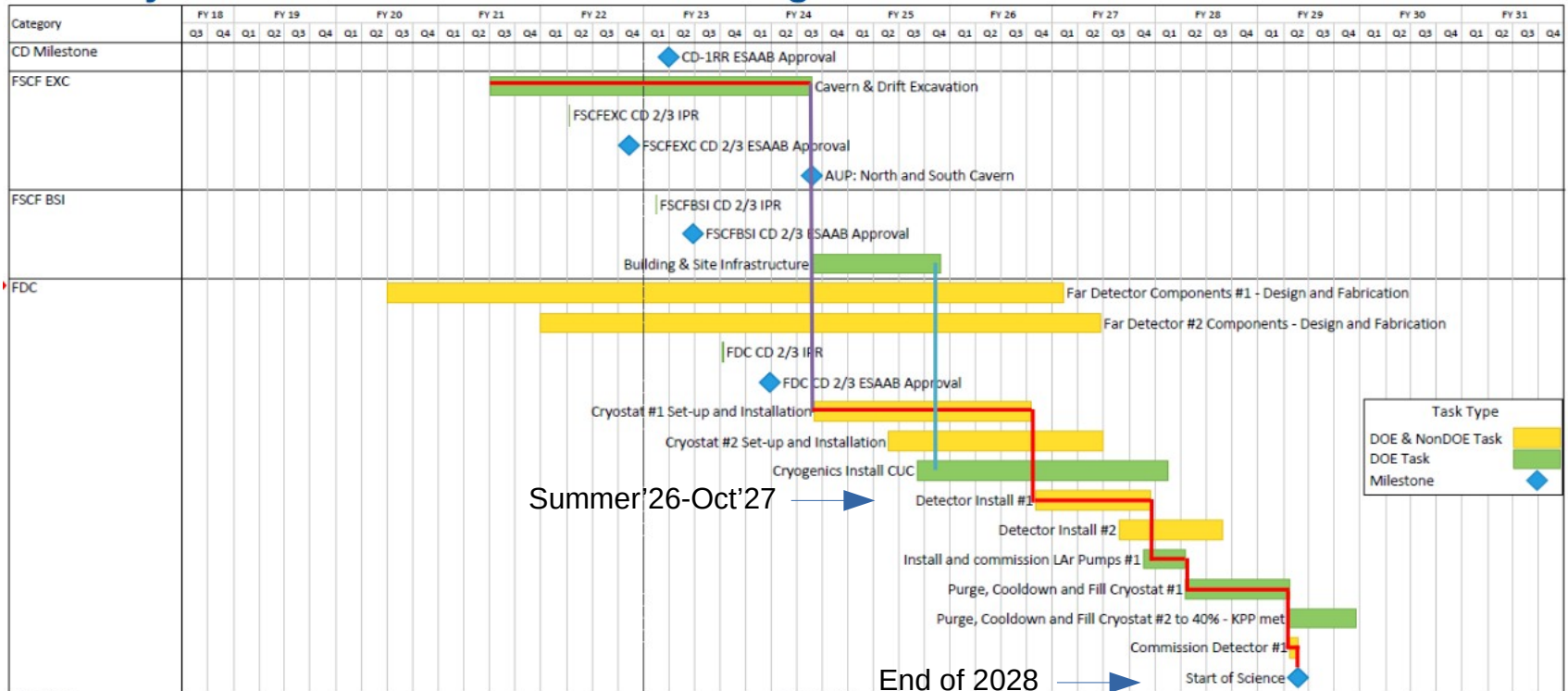
- **FSCF-EXC** – Far Site Excavation
- **FSCF-BSI** – Far Site Building & Site Infrastructure
- **FDC** – Far Detectors and Cryogenic Infrastructure

- **NSCF+B** – Near Site Conventional Facilities + Beamline
- **ND** – Near Detectors

International Project Status

	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

Far Detector Schedule



Notes:

- Fiscal Year display
- Sep 2022 reporting cycle
- Based on "CD-1RR ESAAB" profile

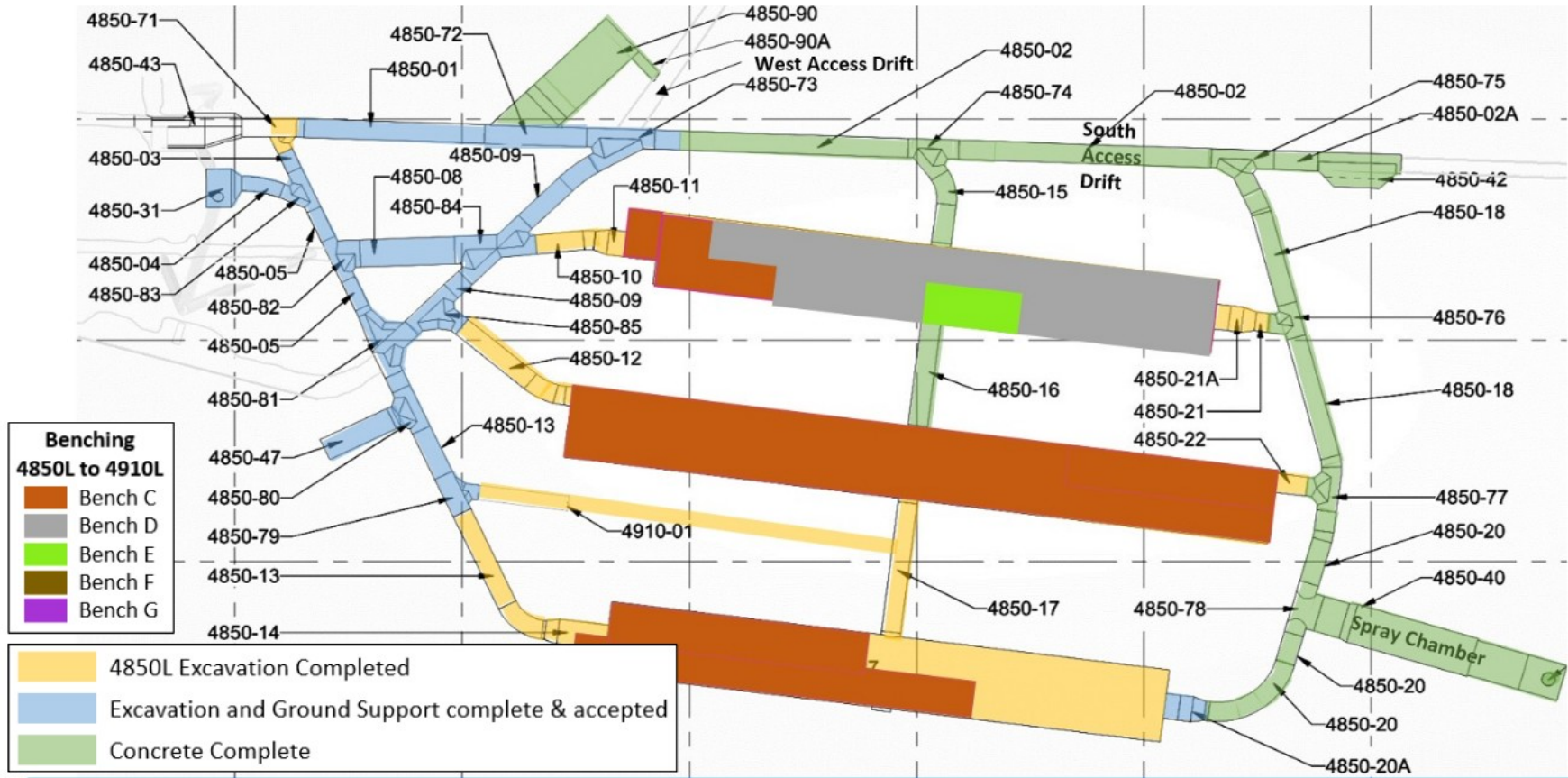
Legend:

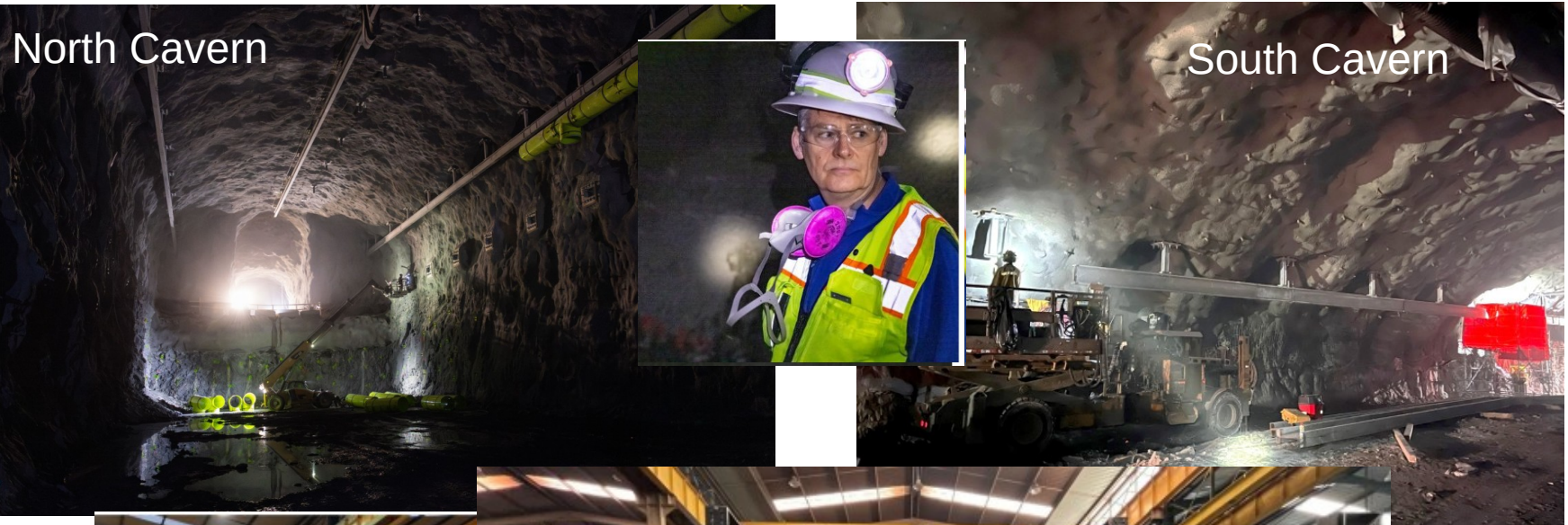
- Red:** Critical Path
- Blue:** Subproject Links
- Purple:** Critical Path and Subproject Links



Excavation Progress

Excavation >64% complete

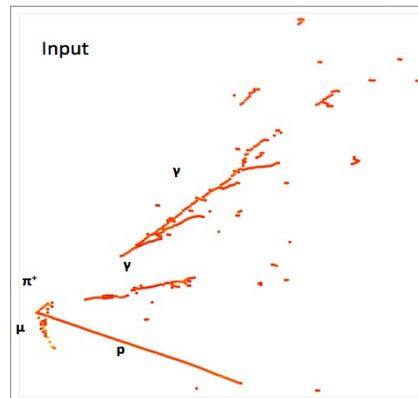
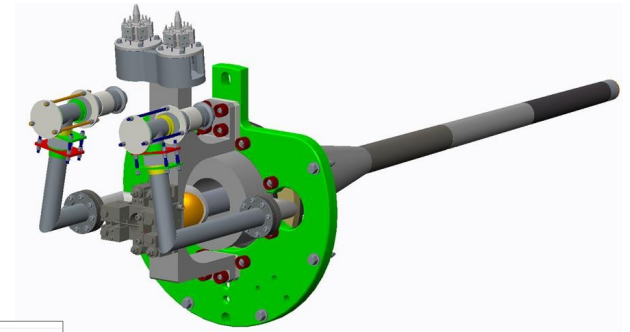
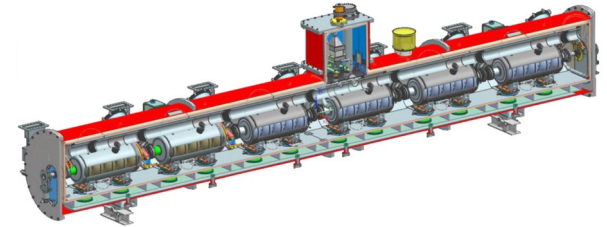




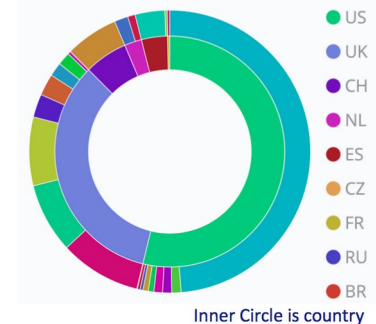
Cryostat steel fabrication and testing, Spain

LBNF/DUNE UK Project

- **PIP-II:** deliver 3 high beta superconducting RF cryomodules for end stage of PIP-II linac
- **LBNF Target:** supply 1.2 MW helium-cooled graphite target plus associated infrastructure
- **DUNE:** 137 APA modules for FD-1; DAQ for DUNE-FD; LAr reconstruction software and computing contributions



CPU Hour fraction Feb 1 - May 20



LBNF/DUNE UK Project

- The UK projects have been through reviews to release funding to completion
- **Target** was organised as separate Phase 1 and 2 projects and have already passed through a PPRP review last year releasing full funding for Phase 2 (April'22-March'27)
- **PIP-II** went through Mid-Term Review in February: international schedule slips, Covid-19, some procurement pressures have meant the delivery of the 3rd module in Oct'26 will slip by 1 year. Ample slack in international schedule. Change request approval sought from Project Board at autumn meeting
- **DUNE** also went through Mid-term Review in February

DUNE-UK MTR Main Outcomes

- DUNE-UK recognised as a high strategic priority by STFC
- With the APA and DAQ WPs at different stages and durations, makes sense to transition to separate projects with their own Principle Investigator and Project Manager and schedule for peer review (PPRP)
- **Reconstruction and Computing:** PI(Andy Blake) and PM(Kate Richards) will go to PPRP in September with a completion date matched to the start of physics with FD-HD (Oct'28)
- **DAQ:** PI(Jim Brooke) and PM(Andra Pirvu) runs out to first beam physics in 2031 and is preparing for PPRP in early 2024
- **APA Production:** PI (Justin Evans) and PM(Andra Pirvu), full production has started and will run to 2027; Factory operations staffing/coordination undergoing significant changes and peer review will proceed in due course



Immediate Consequences for APA Production

- In the DUNE MTR report we presented a plan based on what we have learned (the hard way!) is needed to go from prototype to production
- STFC have listened and are backing the changes we already had started to implement
- Reorganisation of staffing: Operations Manager, Controls Coordinator, QA/QC Coordinator, team of ~30 Techs (maximising employment by the Daresbury lab.), etc
- STFC taking direct responsibility for the production, collaborating with university partners who provide components, QA, expert workshop services etc

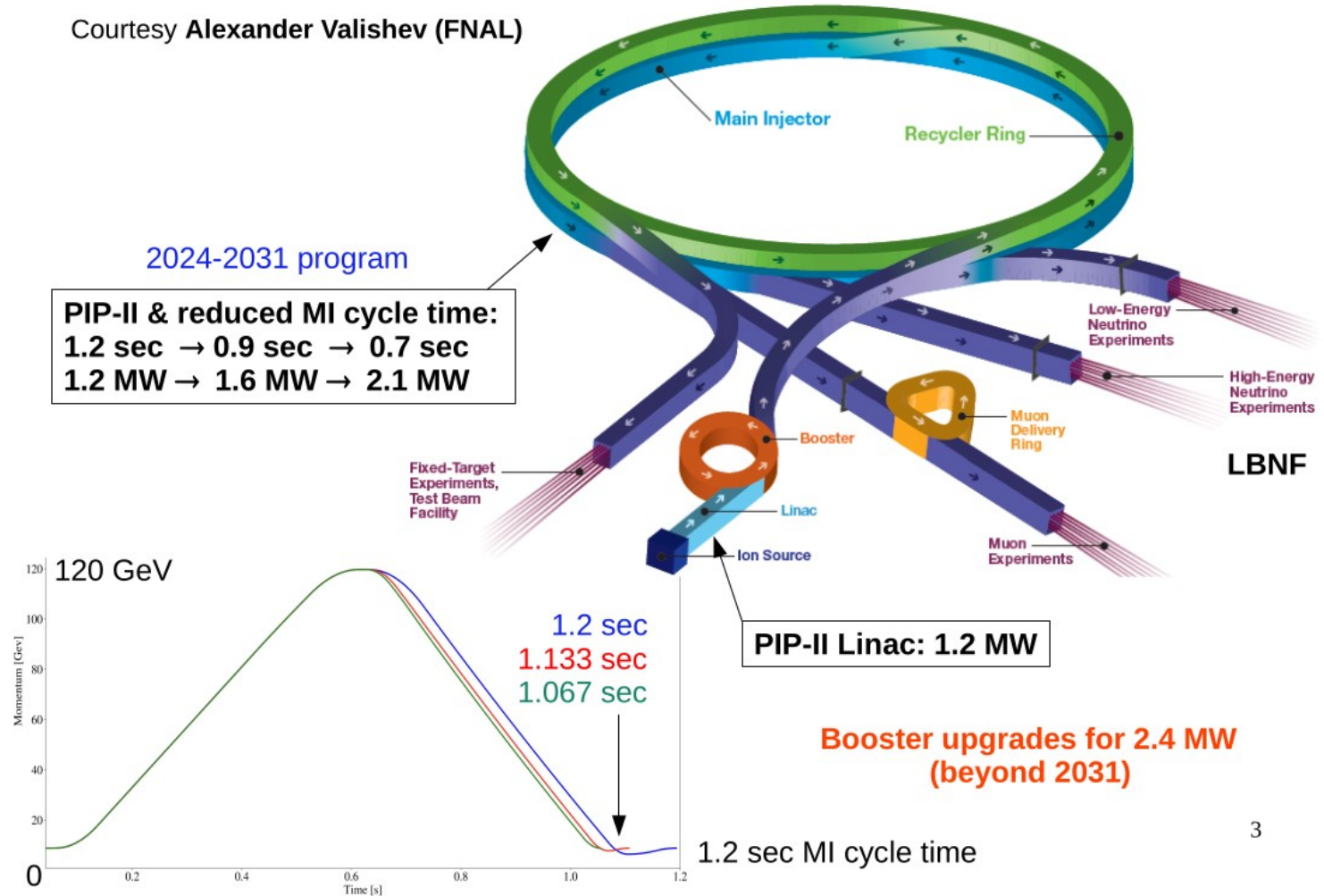
Other news..

- LBNF/DUNE reviewed/monitored in US by LBNC(technology and physics) and **Neutrino Scope Group**(scope, schedule, risk). The NSG had first meeting in May: feedback to extend the resource matrix reporting for the next meeting
- **Directors Review** has just finished in FNAL (practice run for CD-2/3): effort resources for installation and provision for spares needs firming up
- DUNE-IB approved **CF** (assessments and invoices will follow this year) and final draft of the Construction Phase **MOU** is approved and with DOE

Fermilab's ACE plan



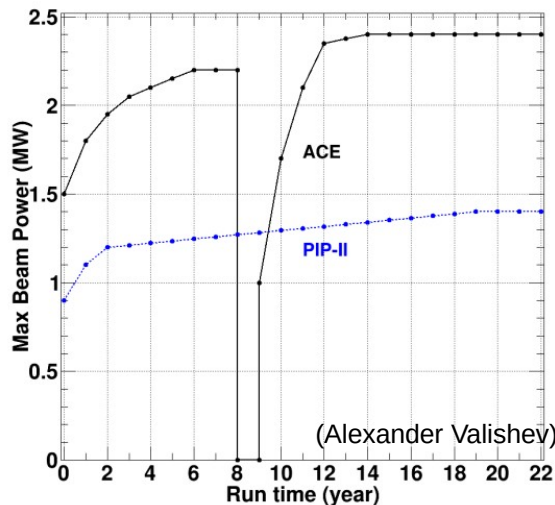
Courtesy Alexander Valishev (FNAL)



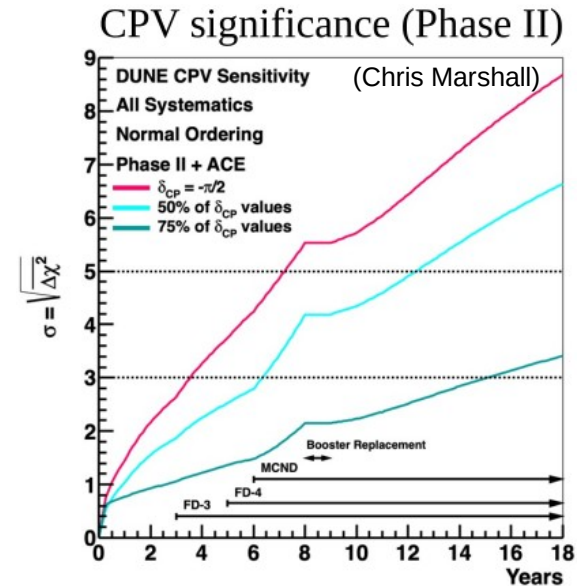
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Payoff for DUNE



- Could see >2MW power by 2035
- Allows P5 goal to be achieved and claws back much competitiveness with Hyper-K
- Consequences for UK HP Target programme: no obvious showstoppers but rep. rate increases demand for more effective He cooling. Perhaps new target materials/approaches needed – studies and engagement needed



Conclude

- Focus in the US firmly on CD-2/3 for the Far Detector and Cryogenics (September)
- Significant changes to the UK APA project triggered by experience gained in delivering a large scale production of items (National Labs taking on responsibility for delivery, project splitting into 3, reorganisation of Daresbury factory staffing)
- The way towards delivery of the UK project is now clear and well-defined - changes will make us fit-for-purpose going into peer review for funding-to-completion

title

- List...
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