LBNF/DUNE Status

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Outline

• Key events and actions currently underway for LBNF/DUNE
The P5 Strategy for U.S. Particle Physics

- A strategic plan for U.S. particle physics that maximizes opportunities for breakthroughs in discovery science
- Explicit prioritization presented, framing decisions within realistic budget scenarios
- U.S. Particle physics community unified behind the plan
  - 2,331 signatures on letter sent to Secretary Moniz and NSF Director Córdova
The P5 report emphasized the global nature of particle physics.

U.S. HEP plan is embedded in the context of a global HEP effort.

- P5 states, “The scientific program required to address all of the most compelling questions of the field is beyond the finances and the technical expertise of any one nation or region.”

International partnerships of growing importance in U.S. science, particle physics seen as a leader of this trend.

- U.S. involvement in LHC at CERN seen as a successful example of international collaboration.
The Big Picture

Fermilab is transforming itself to host the first truly international mega-science facility on US soil as per P5 Plan

• LBNF/DUNE/PIP-II is the highest priority in the lab
• We have adjusted laboratory management and strengthened project support to host a “billion dollar” scale project
• There is a worldwide ground swell of interest in long baseline neutrino science & particle astrophysics with liquid argon detectors
• Nobel Prize accentuates the importance of this physics and sets up the physics we wish to pursue
Ambassador Pamela Hamamoto and DG Rolf-Dieter Heuer
Neutrino Protocol...signed today

NEUTRINO PROTOCOL I

between

THE EUROPEAN ORGANIZATION
FOR NUCLEAR RESEARCH (CERN)

and

THE DEPARTMENT OF ENERGY
OF THE UNITED STATES OF AMERICA (DOE)

to

THE CO-OPERATION AGREEMENT

concerning

SCIENTIFIC AND TECHNICAL CO-OPERATION
IN NUCLEAR AND PARTICLE PHYSICS

2015
CERN Chiefs Visit Washington…encourage support for LHC
International….John Holdren…offered to help
The Long Baseline Neutrino Facility (LBNF)

• P5 Recommendation:
  – Form a new international collaboration to design and execute a highly capable Long-Baseline Neutrino Facility (LBNF) hosted by the U.S. To proceed, a project plan and identified resources must exist to meet the minimum requirements in the text [of the report]. LBNF is the highest-priority large project in its timeframe.

In short, asks Fermilab to do for neutrinos what CERN did for the Higgs boson, involving the worldwide community.
Proton Improvement Plan II (PIP-II)…CD0 achieved

- PIP-II supports longer term physics research goals by providing increased beam power to LBNF while providing a platform for the future
- Infrastructure and workforce development due to LCLS-II work at Fermilab will be leveraged in support of PIP-II, further advancing superconducting radiofrequency (SRF) accelerator capabilities
Making a Successful International Partnership

• A model for successful international partnership:
  – Start from the beginning designing what you wish to accomplish scientifically with international colleagues
  – Have the funding agencies talk to one another and collectively follow the process from the beginning
  – Funding agencies and scientists define the governance structure
  – Discuss the cost sharing with the major partners from the beginning
    • DUNE is ~75% international, and US a partner
    • Aim for ~25% international support for LBNF...Fermilab is host
    • Aim for ~30% international support for PIP-II
  – Encourage major partners to bring their unique and critical expertise to the table
    • *e.g.* U.S. high field magnets to High Luminosity LHC or liquid argon detector technology from Italy to U.S.
LBNF Far Site – Phases of Work Perspective

1. Sanford Lab Reliability Projects  
   * FY16 – 18  
     - Ross shaft rehab  
     - Hoist motor rebuilds, more…

2. Pre-Excavation  
   * FY17 - 20  
     - Rock disposal systems  
     - Ross brow expansion, more…

3. Excavation/Construction  
   * FY18 – 22  
     - Caverns/Drifts/Utilities/Surface building

4. Cryostats/Cryogenic Systems  
   * FY20 – 25
Current Key Events/Actions

• Execute **Final Design process** for Far Site conventional facilities; three parallel tracks:
  - **Pre-excavation design (started last month)**
  - Excavation design (starts July)
  - Buildings, Structures, Infrastructure (BSI) design (starts August)

• President's FY2017 Budget delivered to the hill this week
  - Funding increase ($26M FY16 to $45M FY17)
  - Construction authority requested (pending CD-3a milestone)

• Execute **Lease** for underground and surface areas…signed
  - Lease to go into effect 1 May 2016
  - Environmental assessments complete
Near Term Key Events/Actions

• Achieve CD-3a Milestone (early construction start):
  - DOE PMRC assessment on CD-3a milestone – April 18?
  - ESAAB to approve CD-3a milestone – May

• Award CM/GC contract for phase 1 (pre-award CM services)
  - Complete DOE review process of entire CM/GC contract
  - Select best value proposer and complete award review process
Lines in the Sand

• Working with DOE on three dates to define project
  - End of 2018 to see beam in protodunes
  - Begin installation in 2021 at SURF
  - Deliver beam 1.2MW 2026
Summary

• President’s budget supports a construction start FY17
  - DOE is highly supportive of LBNF/DUNE from OHEP, Director of Office of Science up thru Secretary

• Congress is very supportive
  - The LHC model we use is viewed positively in Washington

• DOE ESAAB process for CD3a soon to be scheduled after PMRC …..in roughly next two months

• Budget process moving forward in US…..

• US community continues to support P5 plan intertwining CERN/US …..strong support from CERN critically important

• Fermilab fully behind P5 plan

• Strong DUNE leadership appreciated….spokes and technical
Questions?
LBNF/DUNE – Construction Summary Schedule Overview

Critical paths shown in RED

* Numbered Notes refer to list on previous slide

DOE Activity
DOE and Non-DOE Activity
Non-DOE Activity

Cryostat #1 Ready for Detector Installation
Det #1 Commissioned
Beamline Complete

DUNE Euro-meet