Long Baseline Neutrino Facility & Experiment

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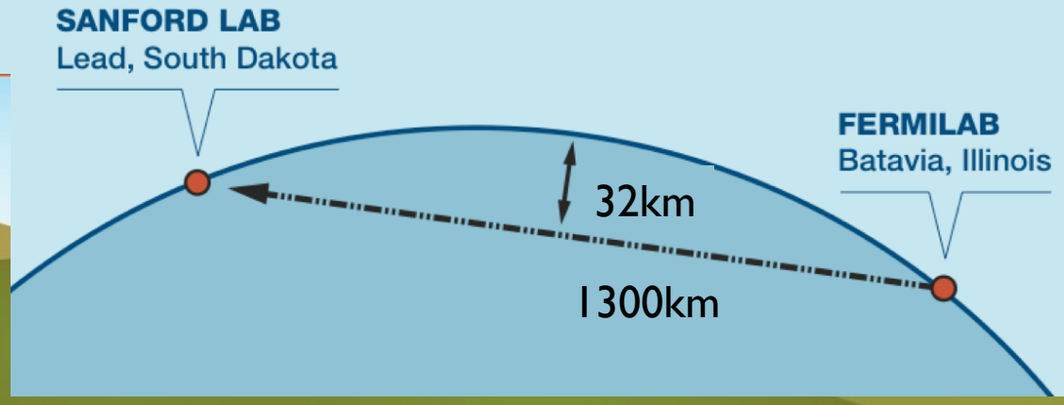
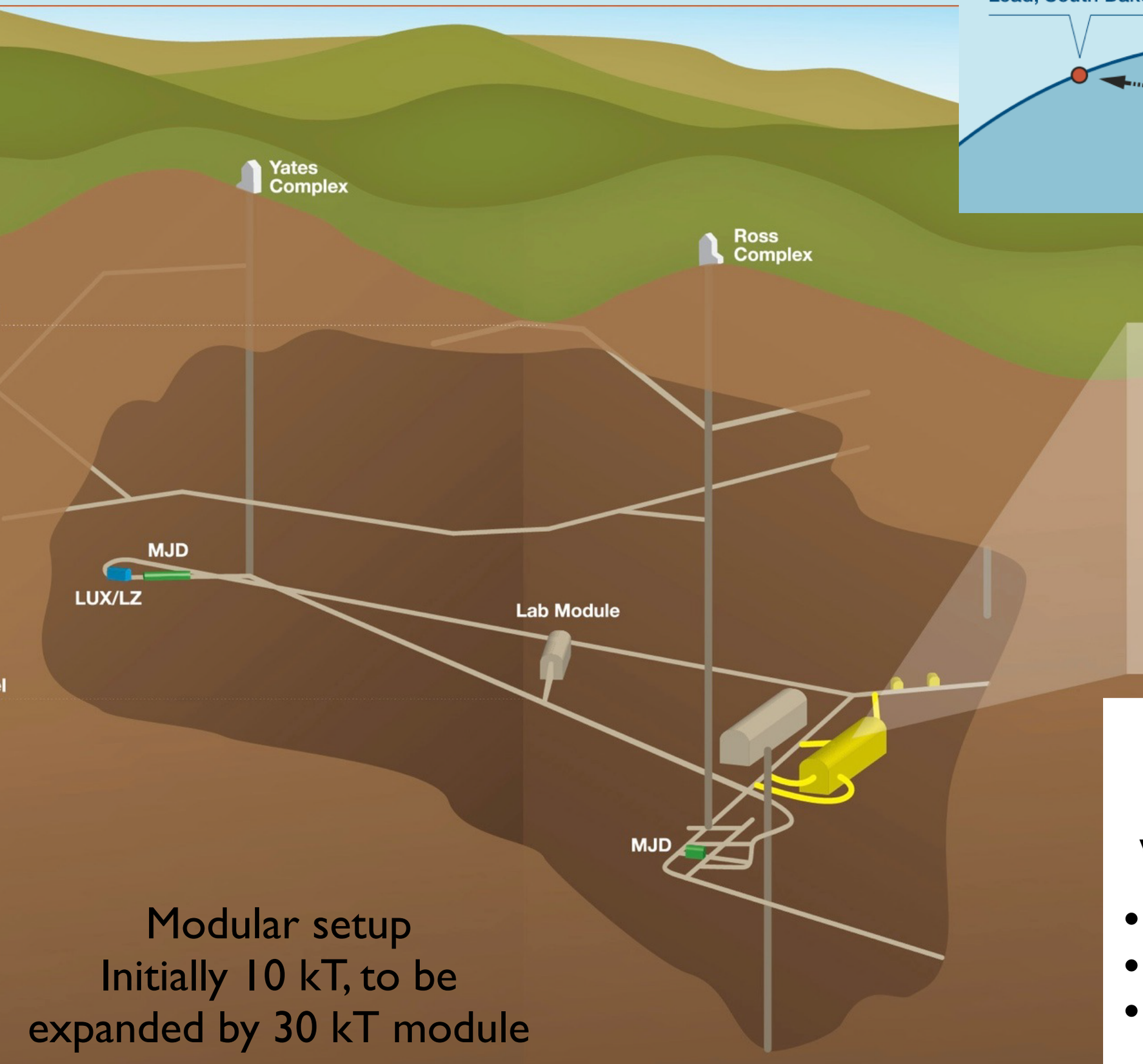
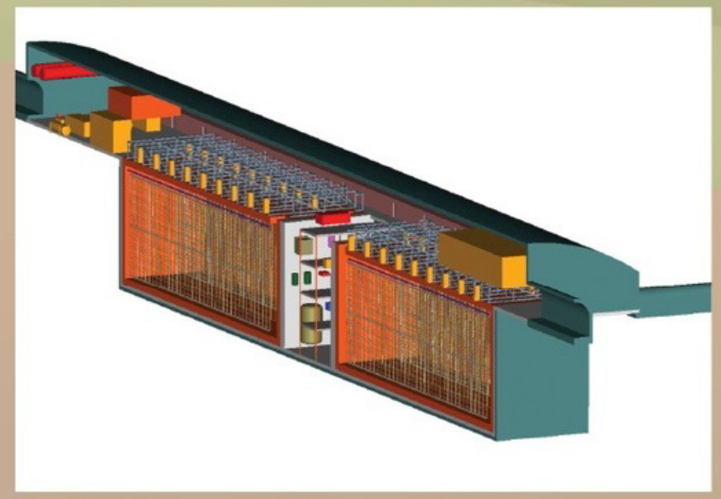
"A 25+ year Physics Program"

- Bring a global neutrino community together:
  - Neutrino Properties:
    - Test CP violation in the lepton sector
    - Determine the ordering of neutrino masses
    - Test the three-ν paradigm
  - Astroparticle physics:
    - Atmospheric ν and core-collapse SN ν
    - Searches for nucleon decay
- Identified as a frontier of high priority and rich opportunity:
  - CERN/Euro Strategy & US/P5 (& Japan/HyperK)
  - US is enthusiastic about hosting - FNAL → SURF, 1300km baseline







Modular setup
Initially 10 kT, to be
expanded by 30 kT module

What's in a Name?

- It was LBNE
- LBNF → ν-beam Facility
- ELBNF → to be changed

Brief History

- P5 report in late May:
  - Recommendation 12: In collaboration with international partners, develop a coherent short- and long-baseline neutrino program hosted at Fermilab.
  - From report: **"The minimum requirements to proceed are the identified capability to reach an exposure of at least 120 kt*MW*yr by the 2035 timeframe, the far detector situated underground with cavern space for expansion to at least 40 kt LAr fiducial volume, and 1.2 MW beam power upgradable to multi-megawatt power. The experiment should have the demonstrated capability to search for supernova (SN) bursts and for proton decay, providing a significant improvement in discovery sensitivity over current searches for the proton lifetime. "**
- Late June: CERN: next 5 years generic ν R&D, design support long baseline νs
- Fall: number of Interim Executive Board meetings (European + US partners)
- Late November: Letter of Intent
  - http://www.fnal.gov/directorate/program_planning/Jan2015Public/LOI-LBNF.pdf
  - 527 people signed
- December: two "community meetings" at CERN & Fermilab
- Presented to the FNAL PAC in January: enthusiastic endorsement
  - First proto-collaboration meeting Jan 22-23, 2015:
    - Memorandum of Collaboration: procedure for election of spokesperson; writing bylaws; setting up working groups etc
    - Sergio Bertolucci elected interim Institution Board Chair
  - Next meeting April 16-19, 2015

From the LOI Summary

This LOI establishes the first step in the creation of new, international collaboration that unifies the world's two very long-baseline neutrino collaborations and other interested scientists from all over the world. It proposes to build a state-of-the-art liquid argon detector deep underground for the purposes of unraveling the mysteries of the neutrino, observing proton decay, and detecting thousands of neutrinos coming from a supernovae explosion, and a high-resolution near detector to support the measurements with the far detector and enable a rich program in neutrino scattering physics. This collaboration will exploit the major and expanded facilities foreseen at Fermilab and Sanford Underground Research Facility in order to carry out its science. To quickly establish itself on the world stage, the collaboration aims to have a 10-kton-module underground in 2021. The goal is to begin beam operations with the full scope detector in 2024 and the plan is to operate the experiment for more than a decade.