

DUNE Proposal

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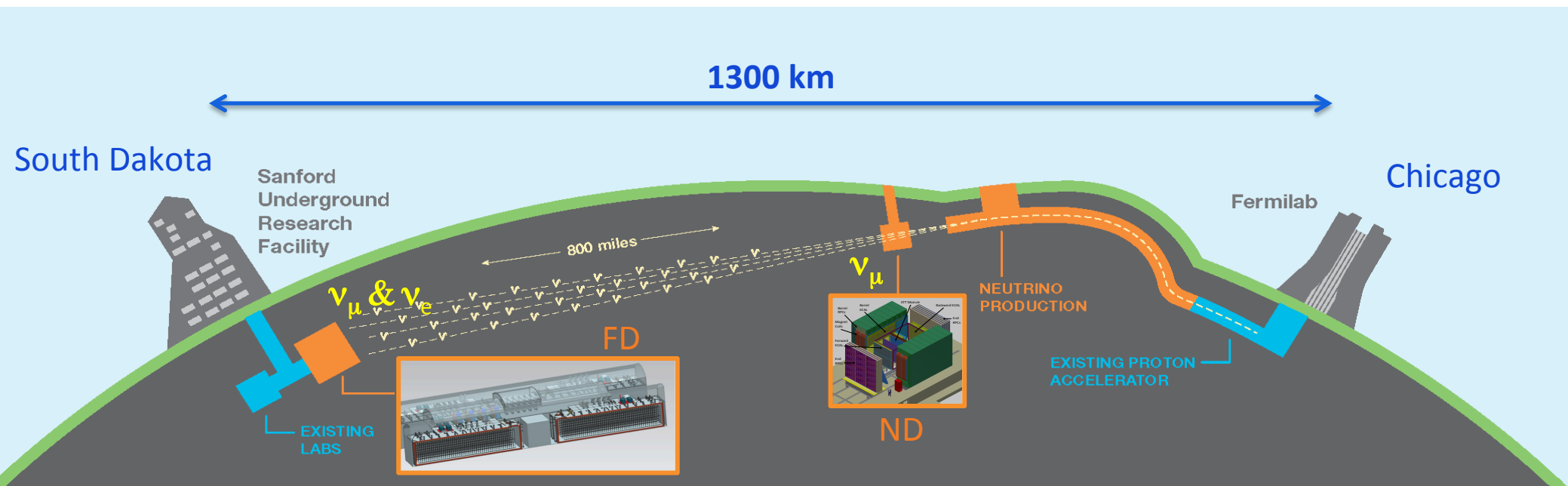
Nick Lurkin

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1. Introduction: LBNF/DUNE

- LBNF/DUNE will consist of
 - An intense **1.2 MW upgradeable** ν beam fired from Fermilab
 - A massive (**70,000 t**) deep underground LAr detector in South Dakota and a large Near Detector at Fermilab
 - A large **international** collaboration

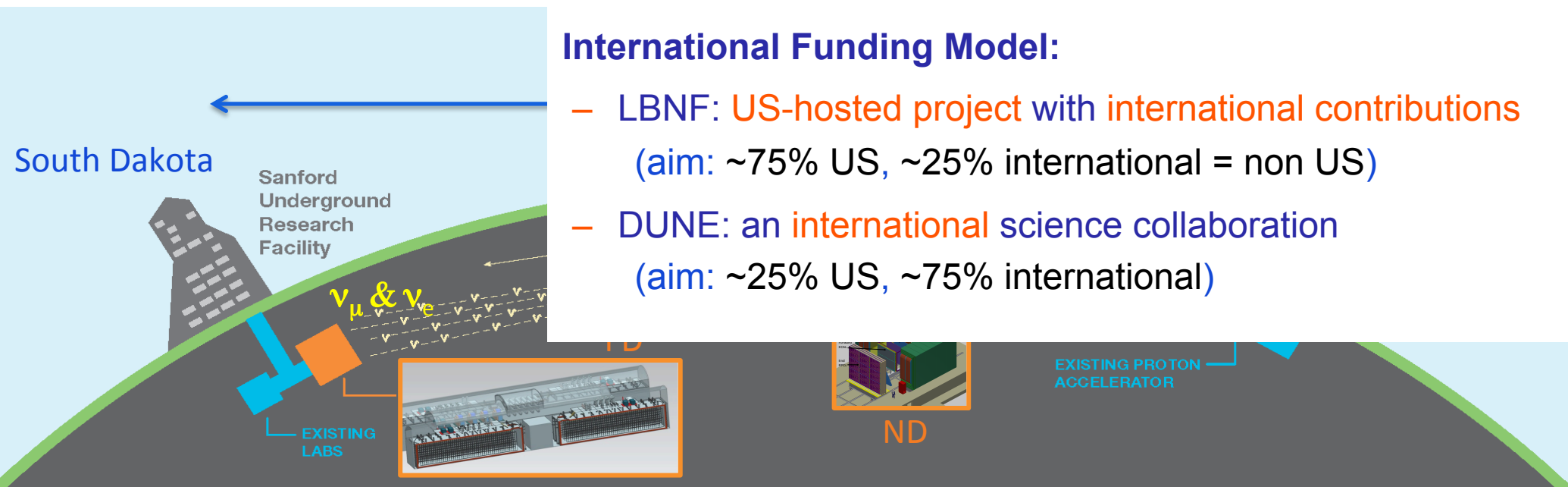


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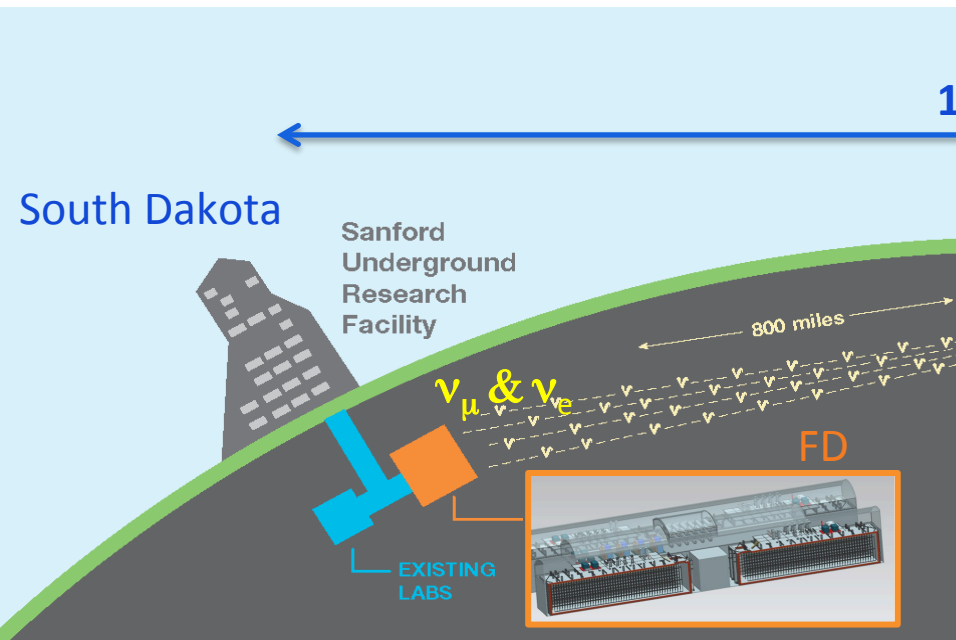
International Funding Model:

- LBNF: **US-hosted project** with international contributions
(aim: ~75% US, ~25% international = non US)
- DUNE: an **international science collaboration**
(aim: ~25% US, ~75% international)



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Main scientific objectives:

- Neutrino oscillation parameters
 - Precision oscillation parameter measurement
 - Mass hierarchy
 - CP violation
- Nucleon decay search
- Supernova core collapse measurement

Schedule/Milestones

★ Schedule based on realistic funding profile

- Current DOE planning line
- Planned CERN contributions
- Anticipated other international contributions

★ Key milestones (**stakes in the ground**):

- **2017:** start of underground excavation at SURF
- **2018:** operation of two large-scale prototypes at CERN
- **2021:** start of installation of first 10-kt far detector module
- **2024:** start of commissioning/operation of 20-kt
- **2026** start of beam operation (1.2 MW)

★ A lot of activity now and in coming years...

DUNE-UK



As of 0500 today

from

110 Collaborators

13 UK Institutes

Bristol, Cambridge, Durham, Imperial, Lancaster, Liverpool, Manchester, Oxford, Sheffield, STFC-RAL, Warwick, UCL

+ will soon join: STFC-DL & Birmingham + Edinburgh (?)

- **Strong UK Leadership within DUNE:**
 - Co-spokesperson (M. Thomson)
 - Co-coordinator of protoDUNE-SP @ CERN (C. Touramanis)
 - Chair of Speakers Committee (S. Soldner-Rembold)
 - Head of Beam Optimization Group (A. Weber)
 - Coordinator of DUNE DAQ group (G. Barr)
 - + a significant number of WG convenership roles

Preparing bid for 2-year R&D programme (2017-19)

- Prior to full construction bid
- Main UK hardware areas:
 - Anode Plane Arrays for LAr TPC
 - DAQ & Trigger
- Linked to ProtoDUNE demonstrator at CERN
 - Currently being constructed in North Area
 - Scheduled for neutrino beam in 2018

The challenge:

- DUNE far detectors will be 4x17kT LAr TPCs
 - Millions of channels distributed over large area.
 - Not a quiet environment.
 - Size of system requires low cost/channel
- Events can be timed (beam) or untimed (nucleon decay, supernovae)
 - Trigger must inspect all data. Very large volume. Some data must be buffered for extended periods.
- System must be designed for long operation period
 - Choose interfaces with replacement/upgrade in mind

Objective

- Establish solution and leadership for construction bid
 - Hope to build DAQ for 2 far detector modules

Work packages

- ProtoDUNE Commissioning & Operation
- DAQ Computing Software
- DAQ Hardware and Firmware
- Front End Data Handling

- Group formed from members of ATLAS Trigger and NA62 groups
 - Alan, Evgueni, Juraj, Steve, Tonino, Nick, Francesco, Richard have expressed interest
- DAQ activity obvious area of focus
 - Expertise here includes DAQ operations, hardware, firmware, software and simulation
 - In particular, few groups have experience with the sort of readout board needed here

Balance of programme/Statement of Intent

- Suggested main activity in DAQ hardware/firmware project
 - Primarily Birmingham and Bristol have capabilities here
- Expressed strong interest in ProtoDUNE DAQ operations
- Noted that have people who could contribute to other areas of package

Possibility of some additional effort/funding through prototype bid

Have applied for membership of international collaboration

- Process seems relatively simple
- Application will be considered at meeting on Sep 14th
 - Will join meeting by phone
 - Write and circulate material over the weekend!

There's an opportunity here

- Likely to be leading UK project in neutrino field over next decade

"Diversify the group's portfolio"

- A different type of physics, different funding tensions

They want us

- Birmingham group have a reputation in an area that's key to DUNE UK ambitions
- A chance to play a significant role