

# REPORT FROM IIEB

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# Composition

- **Nigel Lockyer (FNAL - interim Chair)**
- **Dario Autiero (IPNL), Edward Blucher (Chicago), Brajesh Choudhary (Delhi), Milind Diwan (BNL), Antonio Ereditato (Bern), Carlos Escobar (UNICAMP), Bonnie Fleming (Yale), Takuya Hasegawa (KEK), Chang Kee Jung (Stony Brook), Ed Kearns (Boston), Yury Kudenko (INR), Thomas Patzak (Université Paris-Diderot)**
- **Andre Rubbia (ETH), Carlo Rubbia (GSSI-INFN), Federico Sanchez (Barcelona, IFAE), Kate Scholberg (Duke), Stefan Soldner-Rembold (Manchester), Hiro Tanaka (UBC), Mark Thomson (Cambridge), Bob Wilson (Colorado State), Agnieszka Zalewska (H. Niewodniczański Institute), Kate Scholberg (Duke), and Marco Zito (Saclay)**

# Meetings

- **iIEB has met 4 times:**

1. **23/34 September 2014**

- Broad outline of project and organisation discussed
- Outline discussion of budgets and approval process, timeline for PIP II
- Process to resolve outstanding issues (e.g. baseline) discussed
- Initial thoughts on Governance model discussed
- Relationship of LBNF with Hyper-K and SBL programme discussed
- Noted that work on “systematic uncertainty management” required
- Initial discussion of working groups

2. **20 October 2014**

- Meeting took place following visit to SURF
  - **Agreed SURF as detector site**
- No minutes on the iIEB WWW site

3. **11 November 2014**

- Initial discussion of agenda for 05Dec14 and 12Dec14 meetings
- Formation of Lol writing committee

4. **22 November 2014**

- Discussion of emerging Lol
- Discussion of work of “governance group”
- Call for nominations for iIEB chair
- Definition of first LBNF collaboration meeting 22/23 January 2015 ... FNAL or BNL
- Discussion of Memorandum of Collaboration

5. **5 (CERN) & 12 (FNAL) December 2014**

- Not really iIEB meeting ...
  - **“Open meetings for the scientific community to form the LBNF”**

# Agreements

- **Terms of reference for the iIEB**
  - **Guides completion of Lol, catalyses formation of collaboration**
  - **Completes its mandate when collaboration formed**
- **Baseline, far-detector site, fiducial volume:**
  - **1300 km; far detector at SURF**
  - **40 kT LAr; initial 10 kT – goal to be in operation by 2021**
- **iIEB chair:**
  - **Sergio Bertolucci**
- **Lol:**
  - **[http://www.fnal.gov/directorate/program\\_planning/Jan2015Public/LOI-LBNF.pdf](http://www.fnal.gov/directorate/program_planning/Jan2015Public/LOI-LBNF.pdf)**
  - **Submitted to PAC**
- **Memorandum of Collaboration**
  - **Recently circulated**
    - **Antonio will discuss**

# Letter of Intent

## An Experimental Program in Neutrino Physics, Nucleon Decay, and Astroparticle Physics Enabled by the Fermilab Long-Baseline Neutrino Facility

### 1. Executive Summary

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This is a Letter of Intent (LOI) by a global neutrino community to pursue an accelerator-based long-baseline neutrino experiment, as well as neutrino astrophysics and nucleon decay, with an approximately 40-kt (fiducial mass) modular liquid argon TPC (LAr-TPC) detector located deep underground and a high-resolution near detector. Several independent worldwide efforts, developed through many years of detailed studies, have now converged around the opportunity provided by the megawatt neutrino beam facility planned at Fermilab and by the new significant expansion with improved access foreseen at the Sanford Underground Research Facility in South Dakota, 1,300 km from Fermilab.

The principle goals of this experiment are to carry out a comprehensive investigation of neutrino oscillations to test CP violation in the lepton sector, to determine the ordering of the neutrino masses, and to test the three-neutrino paradigm; to perform a broad set of neutrino scattering measurements with the near detector; and to exploit the large, high-resolution, underground far detector for non-accelerator physics topics, including atmospheric neutrino measurements, searches for nucleon decay, and measurement of astrophysical neutrinos (especially those from a core-collapse supernova).

The new international team has the necessary expertise, technical knowledge, and critical mass to design and implement this exciting discovery experiment in a relatively short timeframe. The goal is the deployment of the first 10-kt fiducial mass detector on the timescale of 2021, followed by future expansion to the full detector size as soon as possible. The PIP-II accelerator upgrade at Fermilab will provide 1.2 MW of power by 2024 to drive a new neutrino beam line at Fermilab. There also exists a plan that could further upgrade the Fermilab accelerator complex to enable it to provide up to 2.4 MW of beam power by 2030. With the availability of space for expansion and improved access at the Sanford laboratory, this international collaboration will develop the necessary framework to design, build and operate a world-class deep-underground neutrino and nucleon decay observatory. Fermilab will act as the host laboratory. This plan is aligned with the European Strategy Report and the US HEPAP Particle Physics Project Prioritization Panel (P5) report.