

# LBNE Meeting Sept. 2010, FNAL

← “New” World

Beam

FD

ND

← Thar be Sea  
Monsters

→ “Old” World

R.Svoboda



# Seattle PWG Workshop

- <http://www.int.washington.edu/PROGRAMS/10-2b/>
- Meeting of Physics Working Group members with people in theory community in Seattle 9-11 August. Part of a month-long workshop on neutrino physics and astrophysics of LBNE.

Date	Speaker	Powerpoint or .pdf
July 26, 2010	A.B. Balantekin	<a href="#">"Neutrino physics, neutrino astrophysics and the third neutrino mixing angle <math>\theta_{13}</math>"</a>
July 27, 2010	H. Minakata	<a href="#">"Parameter Degeneracy in Neutrino Oscillations (and how to solve it?)"</a>
July 28, 2010	E. Ma	<a href="#">"Symmetry Origin of Observable Nonunitary Neutrino Mixing Matrix in TeV Scale Seesaw Models"</a>
July 29, 2010	S. Petcov	<a href="#">"Neutrino Mass Spectrum, Low Energy Leptonic CP-Violation and Leptogenesis"</a>
July 29, 2010	G. Garvey	<a href="#">"Quasi-elastic Neutrino Scattering"</a>
" "	" "	<a href="#">"L/E Plots from LSND &amp; MB"</a>
July 30, 2010	A. Nelson	<a href="#">"New physics in Neutrino Oscillations? CP violation and Apparent CPT violation from neutrino mixing with exotic states."</a>
August 2, 2010	B. Kayser	<a href="#">"The Big Picture"</a>
August 3, 2010	W. Marciano	<a href="#">"The Proton Size Puzzle &amp; <math>a_\mu</math> (muon anomalous magnetic moment) confront <math>\nu_\mu</math> vs anti-<math>\nu_\mu</math> Oscillations"</a>
August 3, 2010	P. Machado	<a href="#">"Interpretation of MINOS data in terms of non-standard neutrino interactions"</a>
August 5, 2010	J. Conrad	<a href="#">"DAE<math>\delta</math>ALUS - A Novel Approach to CP Violation in the <math>\nu</math> sector"</a>
August 5, 2010	M. Shaevitz	<a href="#">"Daedalus - LBNE Combinations"</a>
August 5, 2010	K. Scholberg	<a href="#">"Physics with the DAE<math>\delta</math>ALUS at the 300 ft level"</a>
August 6, 2010	W.C. Louis	<a href="#">"LSND/MiniBooNE Follow-up Experiment with DAE<math>\delta</math>ALUS"</a>
August 6, 2010	N. Tolich	<a href="#">"A Very Large Liquid Scintillator Detector"</a>
August 9, 2010	R. Svoboda	<a href="#">"Overview of the Long Baseline Neutrino Experiment"</a>
August 9, 2010	R. Wilson	<a href="#">"LBNE: Science Overview &amp; Workshop Goals"</a>
August 9, 2010	C. Lunardini	<a href="#">"Diffuse supernova neutrinos at underground laboratories"</a>
August 9, 2010	M. Vagins	<a href="#">"Supernova Relic Neutrinos"</a>
August 9, 2010	K. Scholberg	<a href="#">"Supernova Burst Topical Group Report"</a>
August 9, 2010	N. Tolich	<a href="#">"Solar Neutrino, Geo-Neutrino, Reactor Neutrino Physics Working Group"</a>
August 9, 2010	H. Gallagher	<a href="#">"Atmos/UHE Neutrinos Report"</a>
August 10, 2010	W. Marciano	<a href="#">"New Physics' Matter Effects in <math>\nu_\mu</math> &amp; anti-<math>\nu_\mu</math> Disappearance Oscillations"</a>

...AND MUCH MORE

# Physics Working Group Report

LBNE-PWG-001 (Rel. 1.1)

## Fall 2010 Report from the LBNE Physics Working Group

A. Beck, O. Benhar, F. Beroz, M. Bishai<sup>†</sup>, E. Blaufuss<sup>†</sup>, R. Carr, A. Dighe, M. Diwan, H. Duan, A. Friedland, H. Gallagher<sup>†</sup>, G.T. Garvey, D. Gorbunov, R. Guenette, P. Huber, D. Jaffe, W. Johnson, E. Kearns<sup>†</sup>, S. Kettell, J. Kopp, J. Kneller, W. Louis, C. Lunardini, W. Melnitchouk, S.R. Mishra, A. Moss, V. Paolone, R. Petti<sup>†</sup>, J. Raaf, G. Rameika, D. Reitzner, K. Scholberg<sup>†</sup>, M. Shaevitz, M. Shaposhnikov, M. Smy<sup>†</sup>, R. Svoboda, R. Tayloe, N. Tolich<sup>†</sup>, M. Vagins<sup>†</sup>, B. Viren, D. Webber, L. Whitehead, R.J. Wilson\*, G. Zeller<sup>†</sup>, R. Zwaska

<sup>†</sup>*Topical Group Convener* \**Physics Working Group Coordinator/Editor*  
(Dated: September 7, 2010)

This report has been prepared by the LBNE Science Collaboration Physics Working Group at the request of the collaboration co-spokesmen and the Executive Committee. It is the first of an anticipated series of internal documents intended to assist the collaboration and the LBNE Project with establishing the best possible science case.

The primary purpose of this “Fall 2010” document is to assist in discussions of a collaboration statement on the Far Detector configuration. Nine initial topics were identified as scientific areas that motivate construction of a long-baseline neutrino experiment with a very large far detector. We summarize the scientific justification for each topic and the estimated performance for each of a set of Far Detector reference configurations. We report also on a study of optimized beam parameters and the physics capability of proposed Near Detector configurations.

Discussion: how to finalize. How to release to public?

# Conceptual Design Report

- A goal of this meeting is to come together to discuss the CDR final versions
- FNAL Director's review: readiness for CD-1
- Status: see wiki page at:

[https://wiki.bnl.gov/dusel/index.php/CDR Schedule](https://wiki.bnl.gov/dusel/index.php/CDR_Schedule)

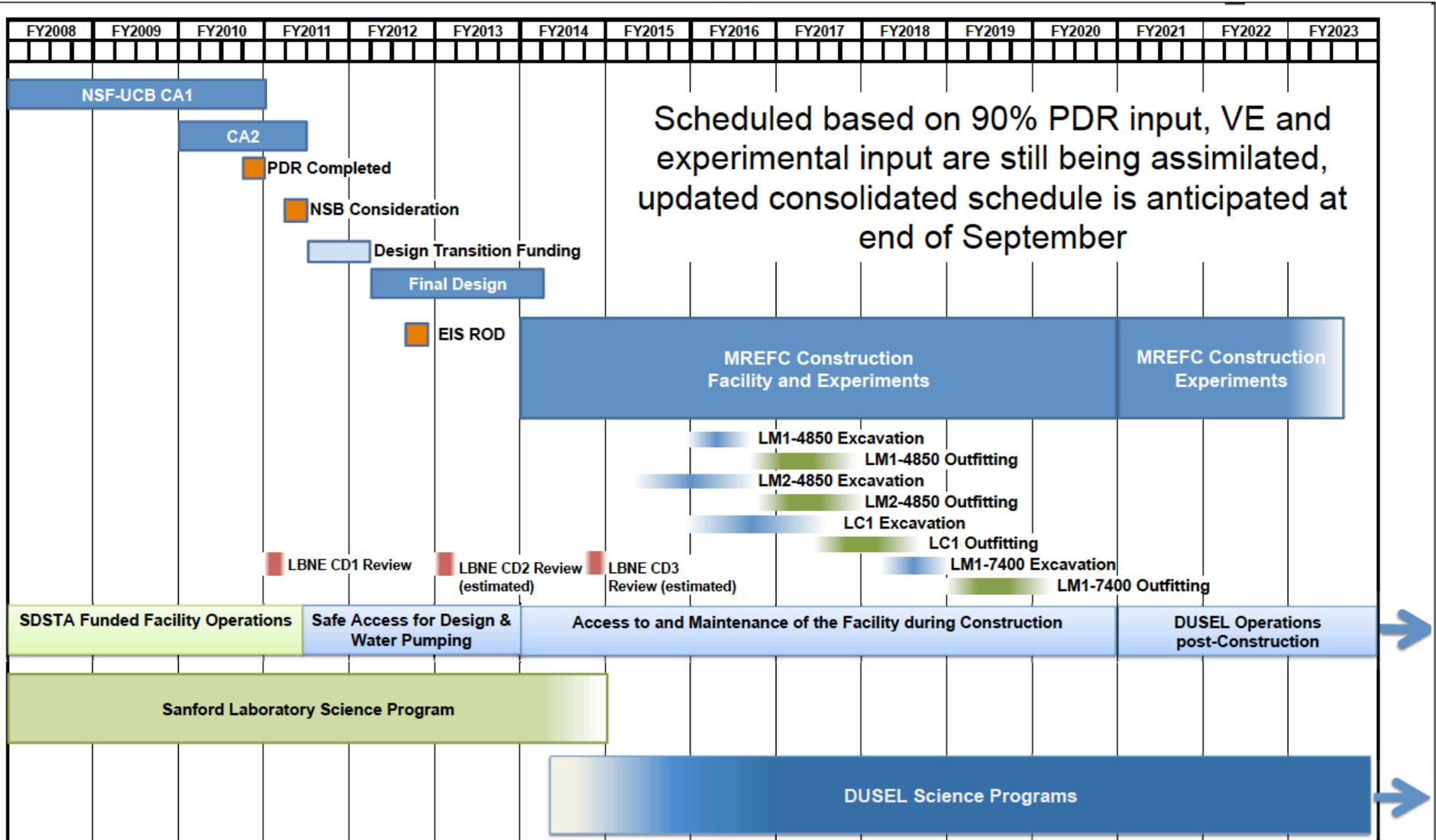
Our current schedule is provided here:

Item	Description	Date
CDR	Authors identified	April 15, 2010
	<a href="#">Detailed Outline/Rough Draft</a>	May 10, 2010
	<a href="#">Intermediate Draft</a>	June 25, 2010
	<a href="#">Internal Review</a>	August 13, 2010
	<a href="#">August 23 Draft</a>	August 23, 2010
	<a href="#">August 30 Draft for internal review</a>	August 30, 2010
	Final for WCD Review	September 10, 2010
	To WCD Review committee	~September 27-29, 2010
	To Temple Review committee	~December 15, 2010
	Final for Lehman	~Feb 1, 2011

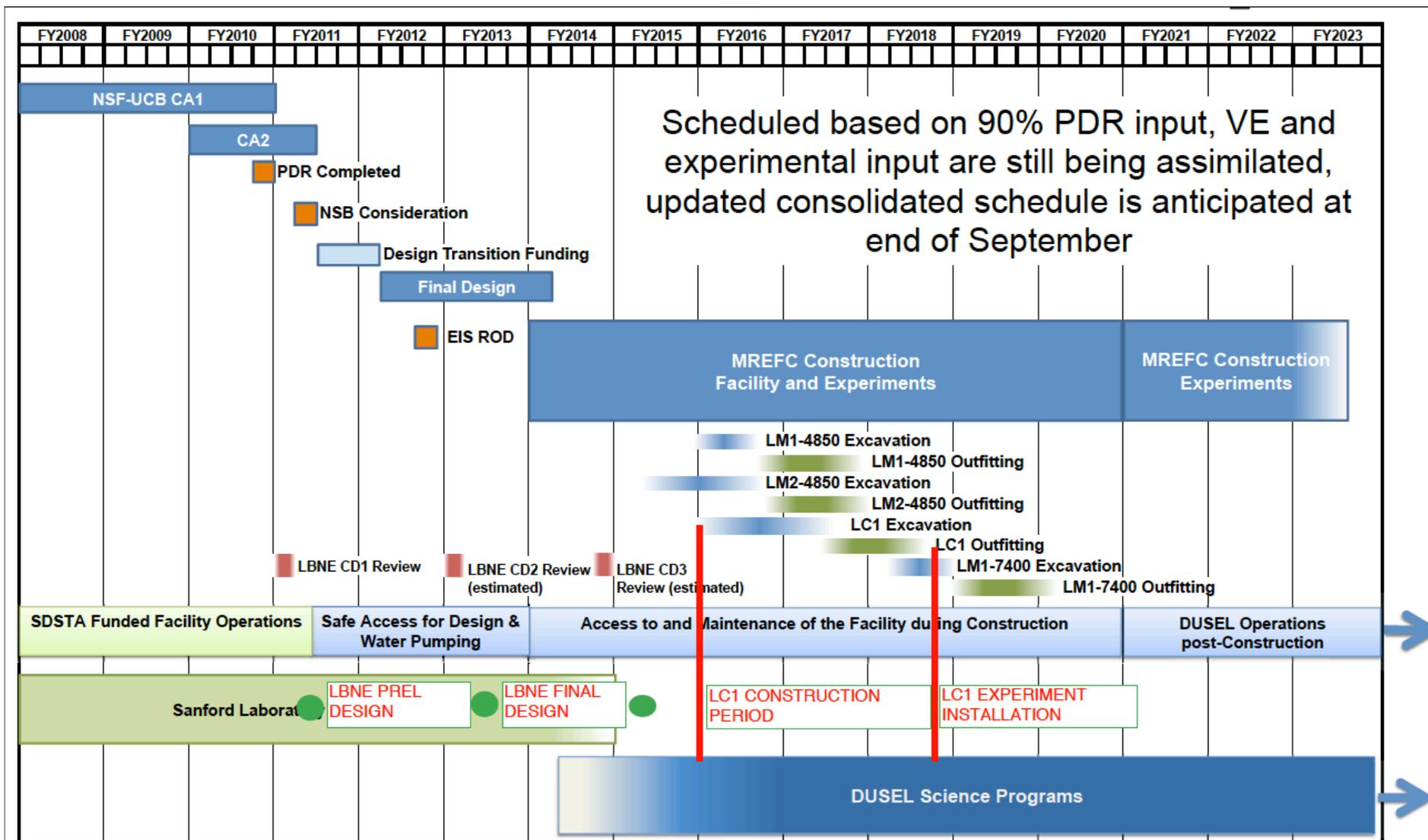
# DUSEL PDR Rollout

- Sept. 2-3 meeting of DURA at FNAL
- <http://www.dusel.org/workshops/fallworkshop10/index.htm>
- “The Facility will present a synopsis of the design, scope, schedule, costs etc. that will be included in the DUSEL Preliminary Design Report to be submitted to NSF. ”

# DUSEL Schedule in MREFC space



# DUSEL Schedule in CD-space



# NRC and NSB Review

- Go/No Go for DUSEL?
- probably yes, at least one historical “come back again” example (Advanced LIGO)
- Need to respond to requests for information from DUSEL as a very high priority

# $\Theta_{13}$ Sea Monsters

LBNE-doc-2558

## Long-Baseline Neutrino Experiment (LBNE): Science and Sensitivity.

Prepared by Milind Diwan, Regina Rameika, James Strait and Robert Svoboda  
for the LBNE Science Collaboration Executive Committee.

8/17/2010

The following is in response to the question posed by the JOG working group  
attached to this note.

Question for IB: What is the procedure for making plots public?

# Daya Bay Summary

- ❖ **The Daya Bay Neutrino Oscillation Experiment is designed to make a precise measurement of  $\theta_{13}$ :**
  - The experiment samples the intense neutrino flux produced by the Daya Bay nuclear reactors in three different locations, with a total of 8 identical detectors.
  - The design sensitivity reaches below  $\sin^2(2\theta_{13})=0.01$
- ❖ **The experiment is progressing steadily:**
  - The civil construction is nearing completion; the Near hall is already completed and the Far hall is being excavated
  - The first detector is already assembled and data has been collected with it in the dry configuration.
- ❖ **We expect the first anti-neutrinos early next year:**

**J. Pedro Ochoa**

LBNL

*for the DAYA BAY  
collaboration*

*Neutrino Oscillation Workshop*

Conca Specchiulla, Italy  
September 9<sup>th</sup> 2010

Experimental Hall	Physics Ready
Daya Bay Near	Spring 2011
Ling Ao Near	Winter 2011/12
Far Hall	Fall 2012

**Stay tuned !**



# Double Chooz Status

- Far detector vessel complete.
- PMTs installed
- Electronics installed and ready
- Liquid filling starts by end of Sept (undergoing engineering/safety review of procedure)
- Installation of outer muon tracker, calibration glove box, etc., then start running by end of year.
- Near detector lab ready to occupy by end of 2011.



# Scenarios

	2011	2012	2013	2014	2015	2016
Far detector	detector construction		10 kton complete	14 kton complete		
Near detector		cavern construction	near detector complete			
Baseline accelerator plan	320 kW	NuMI, RR, & MI work	ramp	700 kW		
Impacted accelerator plan	320 kW	MI NuMI	400 kW	RR	ramp	700 kW

T2K

## □ RENO status

-In order to reach final, all part is being gathering and assembling in the near and far tunnel.

- Working in now
- Electronics
- Electronics and DQA
- Gd Loaded Liquid Scintillator
- RENO Event Display
- Constructing the Veto Tyvec Frame
- PMT setup

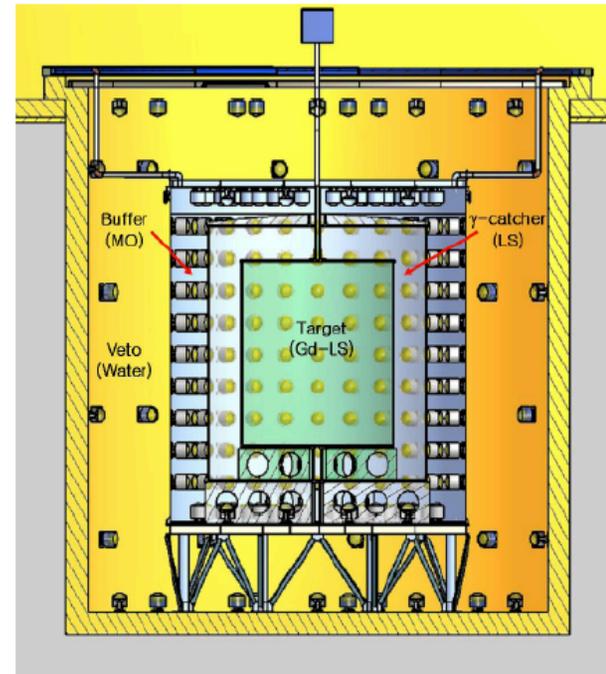


Figure 1.9: A schematic view of RENO detector. A neutrino target of 18.7 m<sup>3</sup> Linear Alkyl Benzene (LAB) based liquid scintillator doped with Gd is contained in a transparent acrylic vessel, and surrounded by 33.2 m<sup>3</sup> unloaded liquid scintillator of gamma catcher and 76.5 m<sup>3</sup> non-scintillating buffer. There are 354 and 67 10-inch PMTs mounted on buffer and veto vessel walls, respectively.

On RENO summary slide: Data taking, end of 2010

# One DocDB!

**Note: this is an archived DocDB**  
**Fresh docs are served from: <http://lbne2-docdb.fnal.gov>**  
**List of Events**

[ [DocDB Home](#) ] [ [Search](#) ] [ [Last 20 Days](#) ] [ [List Authors](#) ] [ [List Topics](#) ] [ [List Events](#) ] [ [Help](#) ]

**LBNE**

 **Fermilab** |  **U.S. DEPARTMENT OF ENERGY**

LBNE Home

## Long Baseline Neutrino Experiment Document Database

### Accessing DocDB

Access [Public](#) or [Private](#) (username/password required) Documents

Access [Certificate Version of LBNE DocDB](#) - If you are accessing this version for the first time, you must first [apply for access](#)  
[More info](#) about accessing certificate version of DocDB

Many thanks to  
David Boehnlein  
and crew for solving  
This long-standing problem!

Fermi National Accelerator Laboratory | [Office of Science/U.S. Department of Energy](#) | [Managed by Fermi Research Alliance, LLC](#)

[SECURITY, PRIVACY, LEGAL](#)

[HOME](#) | [HELP](#) | [PRESS ROOM](#)

# One MOU!

- NSF and DOE continue to hash out an MOU for DUSEL
- A pre-requisite for CD-1
- agreement on who is to steward LBNE reached: DOE
- Mechanism to use DUSEL expertise with DOE stewardship being worked out for LBNE

# One Far Detector Configuration!

- With the completion of the Fall '10 PWG Report, an EC retreat was held at Lake Geneva Sept 9,10.
- Considered recommendations that can be made before release of “final” CD-1 budgets and schedules
- First set of recommendations to be released tomorrow morning
- Next Retreat planned following completion of budget, schedule, and risk information needed for CD-1. Probably December time frame.
- A major goal of this collaboration meeting is for everybody to discuss this document in open session, PWG, IB, hallways, email, blogs
- All agreed that the retreat format is especially useful.



# One Near Detector Configuration!

- PWG report beginning to put together the science and technical case for a Near Detector Complex
- Working plan: EC will review PWG report and project information on near detector and short baseline physics in a similar fashion that it is now doing for the FD configuration
- Recommendation envisioned for sometime next year – after sufficient consensus on content of PWG report, concurrence from project manager, and readiness of EC members.

# One Reference Design!

- The CDR has as a reference design one WC and one LA detector. 2+0 and 0+2 are calculated as “deltas” from this.
- Science will be presented evenly.
- There was a concern that this might be interpreted as a configuration choice
- Project Management, Spokespeople, Executive Committee all agree it is NOT. We have to present SOME configuration + deltas – this is the most convenient choice.

# Proposal-space

- DOE proposal submitted and under review. Some got FY09 supplements based on that proposal.
- We have requested a proposal presentation in October at the DOE. We are now searching for a possible date – stay tuned.
- NSF proposals: one new individual proposal plus one collaborative. Others? Please let spokespeople know! Due Sept
-

# Conclusions

- Join a PWG Topical Group and participate. The content of the PWG Reports are the official view on LBNE on scientific impacts, and physics sensitivities.
- Talk to your IB rep, spokespersons, EC members about EC Recommendations.
- Read the CDR sections that you have expertise in – it is our statement about the technical performance, technical risks, and costs of LBNE.
- Have a good meeting!