



PHYSICS WORKING GROUP REPORT

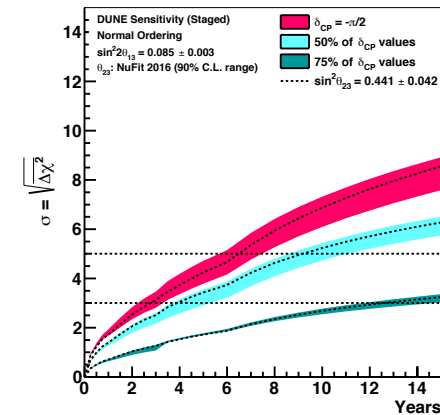
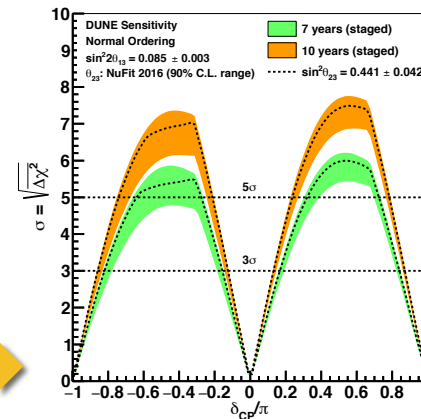
Elizabeth Worcester

DUNE Collaboration Monthly Meeting

March 16, 2018

Technical Proposal

- No physics volume of technical proposal
- Brief summary of physics case will appear in Executive Summary (Volume 1)
 - Based on “DUNE Science” section of CDR Volume 1 (Project Volume)
 - No major update from CDR analyses
 - Long-baseline discussion will be updated to match current public sensitivities
 - Optimized beam
 - Updated staging plan
 - Updated plots and milestones



- Slightly expanded discussion of nucleon decay modes, supernova burst physics
- Add discussion of atmospheric neutrino and BSM physics
- Physics TDR editors responsible for this chapter

Physics TDR Reminders

- Editors: Albert de Roeck and Jon Urheim
- Milestones:
 - May 2018: critical assessment of physics analyses
 - Sept 2018: analysis documentation ready
 - Jan 2019: analyses frozen (9 months!)
 - Feb 2019: internal document review
 - Apr 2019: TDR released for external review (1 year!)
- Comment on protoDUNE
 - We do **not** plan to include results of protoDUNE analyses in the TDR text simply because these results are unlikely to be available in time
 - If encouraging protoDUNE results are available in time to be approved and worked into the document, we will be very happy to do so
 - Likely scenario is that protoDUNE results will be shown alongside TDR results in reviews and public presentations in 2019+ but will be documented elsewhere

TDR Analysis Progress



- May 2018 collaboration meeting is an important milestone for TDR analyses
 - Assess each planned TDR analysis – last chance for dramatic changes in approach
 - Specific targets for each working group were developed at January collaboration meeting
 - Physics coordinators and working group conveners monitoring status of each target to ensure steady progress
- Example Targets:
 - LBL: Demonstrate implementation of cross-section reweighting scheme in LArSoft and CAFAna by producing oscillation sensitivity curves using full machinery
 - NDK+: Establish understanding of FSI uncertainties and impact on $p \rightarrow \nu K^+$ sensitivity

Neutrino 2018 Plans



- DUNE has great work to show! We will highlight progress on LBNF, protoDUNE, ND design, and physics studies....
- New results:
 - **Will not** do a full update of sensitivity studies...save for TDR
 - **Will** show new sim/reco/physics studies to demonstrate the impressive progress since the CDR and Neutrino 2016
 - If possible, show CDR-level oscillation sensitivity using full sim/reco with CVN event selection
 - Working groups preparing new material by **May 1**
- Posters:
 - 12 poster abstracts submitted to Speakers Committee!
 - Deep Neural Networks for Rare Event Searches
 - Oscillation Sensitivity
 - protoDUNE Single-Phase Detector
 - protoDUNE Dual-Phase Detector
 - Supernova Neutrino Detection
 - Triggering on Supernova Burst Neutrinos
 - The Light Detection System in protoDUNE-DP
 - Calibrating a Liquid Argon Detector using Stopping Muons
 - Scintillation Light Simulation in Dual-Phase Liquid Argon TPC
 - Pandora Performance and Impact on Systematic Uncertainty
 - Pandora Performance in protoDUNE
 - BSM Physics

Notes on Public Presentations



- Speakers Committee page:
 - <https://web.fnal.gov/collaboration/DUNE/SitePages/Speakers%20Committee.aspx>
 - Wealth of information including contact info for SC, links to policy documentation, DocDB entries for previous talks, opportunities for future talks
 - Please contact the SC if you:
 - Receive an invitation to give a DUNE talk
 - Would like to submit a contributed DUNE abstract
 - Would like to volunteer for an invited DUNE talk
- Approved Plots page:
 - <http://internal.dunescience.org/plots/>
 - Password protected (same as DocDB)
 - Contains plots approved by working groups and physics coordinators for public presentation
- Personal “Work in Progress”
 - May be shown subject to restrictions described in “Publication and Analysis Approval Policy” (DocDB 1115)
 - Must be approved by appropriate physics working group
 - Regular updates in PWG meetings facilitates approval

Recent/Upcoming Events



- Calibration Workshop: March 14-16
 - See earlier talk
- **Long-Baseline Hack Days: March 20-22**
 - Location is UCL – thanks to Chris Backhouse for hosting!
 - Good participation from UK/European collaborators
 - Agenda is mostly tutorial + working time
 - Zoom connection will be available for tutorial
 - Primary goal is to develop tools for implementation of systematic uncertainty studies for TDR
- Near Detector Workshop: March 22-24
 - See earlier talk