

## Technical Design Report Single Phase: “Calibration Hardware” Chapter Outline

1. Calibration Hardware Overview
  - 1.1. Introduction
  - 1.2. Scope
  - 1.3. Requirements
  - 1.4. Design Considerations
2. Calibration Systems
  - 2.1. Laser Systems
    - 2.1.1. Ionization Laser System
      - 2.1.1.1. Physics Motivation
      - 2.1.1.2. Design
      - 2.1.1.3. Possible Measurements
    - 2.1.2. Photoelectron Laser System
      - 2.1.2.1. Physics Motivation
      - 2.1.2.2. Design
      - 2.1.2.3. Possible Measurements
  - 2.2. Pulsed Neutron Source
    - 2.2.1.1. Physics Motivation
    - 2.2.1.2. Design
    - 2.2.1.3. Possible Measurements
  - 2.3. Radioactive Source Deployment System
    - 2.3.1. Physics Motivation
    - 2.3.2. Design
    - 2.3.3. Possible Measurements
  - 2.4. Additional Systems Considered
    - 2.4.1. External Muon Tagger
  - 2.5. Cryostat Configuration for Calibration
  - 2.6. DAQ Requirements
  - 2.7. Validation of Calibration Hardware Systems
    - 2.7.1. Validation in ProtoDUNE *(only includes plans for post-LS2)*
    - 2.7.2. Validation in Other Experiments
3. Organization and Management *(this entire section will need clarification for what level of detail is appropriate and possible)*
  - 3.1. Interfaces
  - 3.2. Cost
  - 3.3. Risks
  - 3.4. Quality Control
  - 3.5. Safety
  - 3.6. Installation, Integration and Commissioning
  - 3.7. Institutional Responsibilities
  - 3.8. Schedule and Milestones

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# Technical Design Report Physics volume: “Calibration outline”

1. Executive Summary
2. Introduction to LBNF and DUNE
3. Scientific Landscape
4. Tools and Methods Employed
  - 4.1. Monte Carlo Simulations
    - 4.1.1. Hadron Production and Beam Line Modeling
    - 4.1.2. Neutrino Interaction Generators
    - 4.1.3. Detector Response Simulation *(Note: we are assuming any calibration related samples will be absorbed here as appropriate here along with some samples that will go in the calibration detector chapters)*
    - 4.1.4. DAQ Simulations and Assumptions
  - 4.2. Event Reconstruction in the Far Detector
  - 4.3. **Tools and Methods employed for Calibration**
  - 4.4. Tools and Assumptions Employed for Evaluation of Near Detector Capabilities
5. Standard Neutrino Oscillation Physics Program
6. GeV-scale Non-accelerator Physics Program
7. Supernova Neutrino Bursts and Physics with Low- Energy Neutrinos
8. **Calibration Strategy**
  - 8.1. **Physics Driven Calibration Requirements**
  - 8.2. **A Staged Approach**
  - 8.3. **Calibration Sources and External Measurements**
  - 8.4. **Impact of Calibrations on DUNE Physics**
  - 8.5. **Summary, Future Plans and Milestones**
9. *Precision Physics with the Near Detector*
10. Additional Opportunities for BSM Physics
11. Summary and Conclusions