

# Initial list of DPPD deliverables

DocDB #4466

## A. Hardware deliverables

- a. Photo-Sensor (Baseline: Hamamatsu R5912-mod2 PMTs)
  - i. PMT Procurement
  - ii. PMT Characterization and Documentation
  - iii. Wavelength shifter (Baseline: TPC coating)
  - iv. Database with PMT characterization information
  - v. Evaluation of alternative Photo-Sensor (SiPM array)
- b. PMT HV dividers **vi. Light collection optimization systems**
  - i. Design
  - ii. Fabrication
  - iii. ~~Test Stand Design~~
  - iv. Testing
- c. HV/Signal Splitters
  - i. Design
  - ii. Fabrication
  - iii. ~~Test Stand Design~~
  - iv. Testing
- d. Mechanical Assembly
  - i. Design
  - ii. Fabrication
  - iii. Assembly
  - iv. Fixture for attachment to cryostat floor
- e. Cold Cables
  - i. Selection/Validation
  - ii. Fabrication/Procurement
  - iii. ~~Test Stand Design~~
  - iv. Testing
- f. PDS Electronics Infrastructure **Change the name?**
  - i. Develop Cable Routing Plan
  - ii. Design Cable Support Structures
  - iii. Fabricate Cable Support Structures
  - iv. Develop Installation Plan
  - v. Install photon detectors/cables (SURF)
  - vi. Test photon detectors/cables (SURF)

**} Mechanics**

**} Integration**
- g. Signal Flanges
  - i. Develop Cable Routing Plan
  - ii. Design Flange and Cable Support Structures
  - iii. Procure/Fabricate Flange and Cable Support Structures
  - iv. Develop Plan for connecting cables to feed-throughs
  - v. Install cables to feed-throughs (SURF)
- h. Read-out Electronics
  - i. Design **vi. Integration with DAQ**
  - ii. Fabrication **vii. Trigger strategy**
  - iii. ~~Test Stand Design~~
  - iv. Testing
  - v. Firmware programming
- i. Warm HV Cables
  - i. Selection/Validation
  - ii. Fabrication/Procurement
  - iii. ~~Test Stand Design~~
  - iv. Testing
- j. Warm Signal Cables
  - i. Selection/Validation
  - ii. Fabrication/Procurement
  - iii. ~~Test Stand Design~~
  - iv. Testing
- k. HV Power Supplies
  - i. Selection/Validation
  - ii. Procurement
  - iii. Testing
- l. PDS Calibration System
  - i. Conceptual Design
  - ii. Engineering Design
  - iii. Materials Selection
  - iv. Prototyping
  - v. Fabrication
  - vi. Test Stand Development
  - vii. Testing

To be reviewed

# Initial list of DPPD deliverables

## B. Software deliverables

- a. Simulation Code
    - i. Implement PDS Geometry
    - ii. Validate Material Optical Properties
    - iii. Simulation of light formation in liquid argon (full)
    - iv. Simulation of light formation in liquid argon (fast)
    - v. Simulation of Detector Response
    - vi. Validate light simulation with experimental data
  - b. Reconstruction Code
    - i. PDS Event timing reconstruction algorithms
    - ii. ~~PDS Event position reconstruction algorithms~~
    - iii. PDS Event energy reconstruction algorithms
  - c. Calibration
    - i. Run Control Software
    - ii. Analysis Software
    - iii. Calibration Database
  - d. Hardware Database
    - i. QC Documentation
    - ii. Component Tracking
  - e. Data Collection
    - i. Hardware Initialization/Configuration Code
    - ii. Hardware Monitoring Code
  - f. Data Monitoring Code
- } To be added in the WBS

To be reviewed

# Initial list of DPPD deliverables

## C. Physics deliverables

- a. ~~Further development of PDS subsystem requirements~~
- b. Validation of PDS Requirements with respect to Physics Performance
- c. PDS Performance Validation via ProtoDUNE Data Analysis
- d. Demonstrate PDS radiological/cosmogenic background rejection capabilities
- e. Develop strategies for using PDS information to trigger on interesting events
- f. Develop strategies for online reduction of PDS data volume. To be added in the WBS
- g. Editing of TDR chapter To be added in the WBS

To be reviewed

# Initial list of DPPD deliverables

## D. Integration deliverables

- a. System Engineering
  - i. Internal Interface Specifications (within PDS subsystem)
  - ii. External Interface Specifications (with other subsystems)
- b. Development of QA Plan (specification of tests/facilities)
  - i. Material Selection/Characterization
  - ii. Aging tests for material coatings
  - iii. ~~Aging tests for SiPMs~~
- c. Development of QC Plans (for all components)
- d. ~~PDS Integration Test Facility~~
  - ~~i. Design~~
  - ~~ii. Fabrication~~
  - ~~iii. Operation~~
- e. ~~Detector Integration Test Facility~~
  - i. Installation & Commissioning of PDS Components
  - ii. Operation
  - iii. Analysis of PDS Performance

To be reviewed