

Dual Phase Photon Detection System Consortium Meeting

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DPPD Consortium Kick-off Meeting

31 August 2017

Topics

- Review of consortium charge and near-term deliverables
- Membership
- Technical Lead
- Consortium deliverables / interest from institutions
- Practical organization

Each consortium is unique...

From Mark

- **Common consortium structure**

- **But unique features:**

- Different size / level of scope
- Different levels of international mix
- Different TRLs
 - In some cases at (or close to) preliminary design, e.g. APA
 - In others, still design decisions, e.g. DAQ

- **Consequences:**

- Will be differences in internal consortia organization

Consortium Charge

From Eric

- Plan and execute the construction, installation, and commissioning of the far detector subsystems

Not directly responsible for fabrication, installation, and commissioning of the ProtoDUNE subsystems (these are the responsibility of the previously existing ProtoDUNE management teams).

- Develop a provisional set of responsibilities for the detector subsystem among the participating institutions, accounting for realistically available resources
- Develop a detailed breakdown of consortium deliverables and responsibilities that will be incorporated within a global DUNE WBS and milestone-driven schedule that will be tracked by the DUNE Project Office
- Further develop the technical designs for the subsystem as required for moving from ProtoDUNE to the far detector
- Provide scientific support for simulation/analysis activities necessary for producing the Technical Design Reports

Near-term Deliverables

From Eric

- **Updated deliverables list** and preliminary division of **institutional responsibilities** (November 2017)
- **Technical Proposal** (Summer 2018)
 - Summary description of proposed subsystem
 - Updated division of institutional responsibilities (funding matrix)
 - Preliminary cost estimate
- **Technical Design Report** (Spring 2019)
 - Detailed description of proposed subsystem
 - Validation that subsystem meets physics requirements (simulation studies/ProtoDUNE data analysis)
 - Final division of institutional responsibilities (funding matrix)
 - Final cost estimate

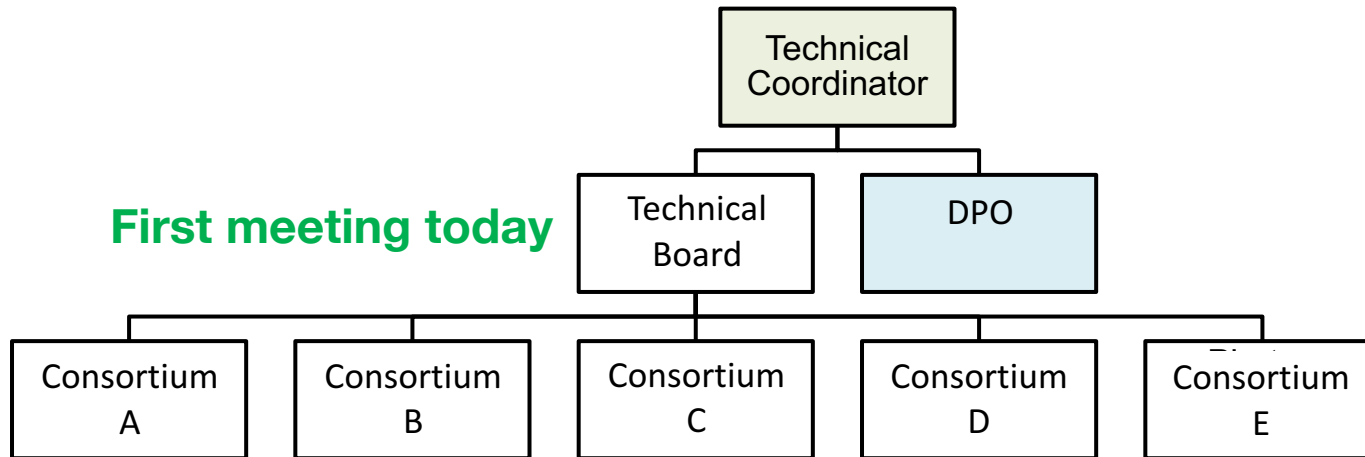
Technical Scope

From Eric

- Although the basic deliverables of each consortium will be the same, different subsystems will require different levels of technical development (post-ProtoDUNE) for producing the Technical Design Reports
- In some cases (e.g. APAs), the expectation is that the far detector subsystem will be very similar to the ProtoDUNE subsystem
 - Focus will likely need to be on a production plan for how to construct the large number of required modules
- In other cases (e.g. DAQ), the subsystem built for the far detectors may have different requirements than that built for the ProtoDUNE detectors, which implies the need for additional design work and R&D effort

General organization

From Eric



Consortia efforts will be coordinated through the Technical Board and DUNE Project Office (DPO).

DPPD Consortium Membership

	Institution	Contact	Email
France	Lab. d'Annecy-le-Vieux de Phys. des Particules	Dominique Duchesneau	duchesneau@lapp.in2p3.fr
Peru	PUCP	Alberto Gaga	agago@pucp.edu.pe
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USA	Duke University	Kate Scholberg	schol@phy.duke.edu
USA	University of Iowa	Jane Nachtman	jane-nachtman@uiowa.edu
USA	South Dakota School of Mines and Technology	Juergen Reichenbacher	Juergen.Reichenbacher@sdsmt.edu
USA	University of Texas (Austin)	Karol Lang	lang@physics.utexas.edu

More collaborators are very welcome!

We need to think on our internal organization but let's try to keep it simple

Discussion Topics

From Mark

- **Technical Leads**

- **Roles**

- Should complement CL
 - Technical probably more important than project (at this stage)

- **Appointment**

- As soon as possible...
 - Driven by CL, in consultation with Spokes & TC
 - Would like to discuss with CLs in person this week
 - Converge as soon as possible

DPPD Technical Lead

- Some nominations received
- Need to finalize discussions
- Try to appoint TL by next week

Discussion Topics

From Mark

- **Short-term Consortium milestones (TBC)**
 - **Consortium meetings/organization fixed asap**
 - Need a rapid start up
 - **For next RRB meeting: November 2nd**
 - Refined list of deliverables
 - WBS
 - Initial mapping of deliverables to institutions/funding agencies
 - There will be gaps
 - **For Technical Proposal: Q2 2018**
 - Technical Proposal, similar level to LHC upgrade projects
 - Cost and schedule
 - Full WBS with institutional/funding agency responsibilities
 - Likely to be gaps...

Initial list of DPPD deliverables

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
 - 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
 - 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)
- 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
 - ii. Fabrication
 - 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 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.
- g. Editing of TDR chapter

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

Next steps

- Agree on our **internal organization**
 - Consortium IB + CL + TL + ?
- Appoint **Technical Lead**
- Review the initial **list of DPPD deliverables**
- Understand the **interests** and possible **contribution** from each **institution**
 - people, capabilities, expected financial resources...
- Draft **WBS**
- Organize **tasks** towards the **Technical Proposal**

Practical information

- Indico page for DPPD consortium meetings:
 - <https://indico.fnal.gov/categoryDisplay.py?categId=699>
- Dedicated mailing lists being prepared:
 - DUNE-FD-PHOTON-DP-CNSRT-REP (for reps)
 - DUNE-FD-PHOTON-DP-CNSRT (all FD DPPS Consortium)
- New pages created
 - DUNE “at Work” → “Working Groups & Consortia” (public)
 - wiki.dunescience.org (private)
- Decide the day (Thursday, 9:00 CDT/16:00 CEST ?) and frequency of our meetings (bi-weekly?)
 - IB-REPS vs ALL

Your input/feedback is fundamental!

Technical Board Responsibilities From Eric

- Primary forum for discussions on issues related to detector design, construction, and installation (items that could have significant impact on physics performance or cost/schedule)
- Project change control board for change requests below some minimal threshold of cost/schedule impact requiring higher-level approvals
- Makes recommendations on technical design decisions, which are then forwarded to DUNE Executive Committee
- Forum for interaction between the consortia members and the DUNE Project Office including monitoring of the overall progress on design/construction efforts

Will begin meeting on a regular basis following this collaboration meeting.

DUNE Project Office

From Eric

- Engineering/Project Management Support
 - Maintain combined project schedule, complete 3-D mechanical model of detectors, documentation of subsystem interfaces, etc...
- Installation
 - Coordination of overall installation effort (consortia will have responsibilities related to the installation of their subsystems)
- Integration
 - Coordination of detector integration facility in South Dakota to receive and process detector components prior to their deployment at SURF (see talk by Marvin Marshak later this afternoon)

Anticipate need for 10th Technical Proposal/Technical Design Report focused on these areas.

Consortia Management

From Eric

