Technical Design Report for ProtoDUNE

immediate

February 10, 2016

submitted on behalf of the DUNE collaboration

Executive Summary [1 page]

This is the executive summary. Write me.

Contents

1 Introduction (Flavio,Christos) [5 pages]

1.1 ProtoDUNE in context of DUNE/LBNF

1.2 Goals of ProtoDUNE

This is the introduction. Write me.

2 Scientific and technical motivations (Thomas)[10 pages]

2.1 Charged particle beam studies

Science description

2.2 Evaluation of event reconstruction performance

2.3 Particle interactions and cross sections

2.4 Detector engineering validation

engineering motivation

2.5 Installation validation

3 ProtoDUNE detector overview (Flavio,Christos,Thomas)[15 pages]

3.1 Detector Requirements

insert detector overview here

3.2 Liquid argon detector properties

- Electron drift + LAr purity etc. - LAr scintillation light

3.3 Wire read out planes

- charge induction and collection

3.4 Space charge effects

3.5 ...

4 Detector components (Tim, Jim)[5-7 p. per subsystem = 60 - 74 p.]

4.1 Anode Plane Assemblies

4.2 Cathode Plane Assemblies

4.3 Field Cage

4.4 HV components

4.5 Photon detection system

4.6 TPC front end electronics and DAQ

4.7 PDS front end electronics and DAQ

4.8 Cryostat and feed-throughs

4.9 Cryogenics and LAr purification system

4.10 Detector monitoring and slow control

4.11 Mechanical mounts and supports

4.12 Beam window

detailed description of detcetor hardware components includng DAQ

5 ProtoDUNE computing and software (Tom, Amir)[15 pages]

5.1 Data handling and processing system

5.2 LArSoft framework

5.3 Event simulation

5.4 Event reconstruction algorithms and performance

description of computing, data handling and on/off-line software

may also include reconstruction software description

6 Space and infrastructure requirements (Maria)[10 pages]

6.1 Installation space and clean room

6.2 QA/QC and testing space

6.3 control room

6.4 Infrastructure requiremenst

6.5 Cooling requirements

cooling water
chilled air

space and infrastructutre requirements in the EHN1 area

7 Test beam specifications (Cheng-Ju, Paola)[10 pages]

7.1 Charged particle beam properties

7.2 Beam monitoring and DAQ

7.3 Run plan

beam parameters etc.

8 Organization, cost estimate and schedule (Eric, Maria)[5-10 pages]

8.1 ProtoDUNE organization

protoDUNE organization within DUNE

8.2 Cost estimate

cost of components and coordination of production, QA/QC and installation

8.3 ProtoDUNE and EHN1 schedule

schedule

9 Summary [2 pages]

This is the summary. Write me.

References