

Draft TMS PDR Chapter

Has been re-organized to match the ND-LAR chapter. Compared to CDR:

- More emphasis on prototyping, construction, installation.
- Less on physics performance.

Steve M, Tom M. and I will finish “gutting” the old material by the end of the week.

If you don’t have access to the CDR overleaf, let us know.

1	The Muon Spectrometer	<u>1</u>
1.1	Overview of TMS	<u>1</u>
1.1.1	Introduction and Scope	<u>1</u>
1.1.2	Principle of Operation	<u>5</u>
1.1.3	Design Parameters	<u>16</u>
1.1.4	Performance	<u>17</u>
1.2	System Design	<u>41</u>
1.2.1	Support Structure	<u>41</u>
1.2.2	Magnet and Power Supplies	<u>42</u>
1.2.3	Detector Modules	<u>44</u>
1.2.4	Detector Electronics	<u>46</u>
1.2.5	WBS Elements	<u>58</u>
1.2.6	Detector Control and Safety Systems	<u>58</u>
1.3	Interfaces	<u>63</u>
1.4	Risks and Mitigation	<u>63</u>
1.5	Schedule	<u>68</u>
1.6	Prototyping Plans	<u>69</u>
1.6.1	Scintillator detector Prototyping	<u>69</u>
1.6.2	Construction Time and Motion Studies	<u>69</u>
1.6.3	Magnet Value Engineering	<u>70</u>
1.6.4	Signal Cables and Noise	<u>70</u>
1.6.5	Steel Plate Thickness	<u>71</u>
1.6.6	Fiber Location Within Scintillator	<u>71</u>
1.6.7	Assembly and Module Strength	<u>71</u>
1.6.8	Fiber attachment to SiPM	<u>72</u>
1.6.9	Coil design	<u>72</u>
1.7	Construction and Installation Plans	<u>72</u>
1.7.1	Steel Procurement	<u>72</u>
1.7.2	Steel support frame	<u>73</u>
1.7.3	Magnet	<u>73</u>
1.7.4	Module Production	<u>74</u>
1.7.5	Cassette Assembly and Transportation	<u>80</u>
1.7.6	Cassette Installation	<u>80</u>
1.7.7	Electronics	<u>80</u>

Where are we now?

A long way from where we need to be!!

Not started (0)

Started (1) [HG: Added post-meeting]

Draft (2)

Edited(3)

Final (4)

Sim / Reco description - (Asa / Jeffrey)

Acceptance - (KiYoung)

Matching to ND-LAr (Kate)

Muon momentum resolution (Jeffrey / Liam)

Muon sign selection (Xiaoyan / Liam)

Module Orientation (Asa)

The Muon Spectrometer PD Report	Responsible	Status
1.1 Overview of TMS	HG/SM	Not started
1.1.1 Introduction and Scope	HG/SM	Not started
1.1.2 Principle of Operation	HG/SM	Not started
1.1.3 Design Parameters	HG/SM	Not started
1.1.4 Physics Performance	HG/SM	Not started
1.2 System Design	TM	Not started
1.2.1 Support Structure	SLAC	Not started
1.2.2 Magnet and Power Supplies	SLAC	Not started
1.2.3 Detector Modules	AF/JA	Not started
1.2.4 Electronics	TK/VP	Draft
1.2.5 WBS Elements	TM	Not started
1.2.6 Detector Control and Safety Systems	TM	Not started
1.3 Interfaces	MO/HB	Not started
1.4 Risks and Mitigation	TM/MO	Not started
1.5 Schedule	TM	Not started
1.6 Prototyping Plans	TM	Not started
1.6.1 Magnet ??	SLAC	Not started
1.6.2 Detector Modules and Cassettes ??	AF/JA/MS	Not started
1.6.3 Electronics ??	TK/VP	Not started
1.7 Construction and Installation Plans	HB	Not started
1.7.1 Steel Procurement	JN/WC	Not started
1.7.2 Support Structure	SLAC	Not started
1.7.3 Magnet	SLAC	Not started
1.7.4 Module Construction	MS/JA/AF	Not started
1.7.5 Cassette Assembly and Transportation	AF/JA	Not started
1.7.8 Cassette Installation	HB	Not started
1.7.9 Electronics	TK/VP	Not started
PERCENT COMPLETE!		0.01851851852

Gold stars: Asa, Thomas K, Vittorio

Deadlines

Our first PDR review will be the week of Feb. 3 (virtual):

1. Do we have all of the required documentation?
2. Does the design meet the requirements?
3. Have we met the required level of technical maturity?
4. High-quality presentations

Will work backwards with Hiro to establish interim deadlines for the PDR Chapter.

- We will try to communicate these to everyone by the end of the week.

All results regarding the physics performance of TMS will need to be approved by ND Sim/Reco according to the procedure in [dune-doc-28237](#) .

- Tech note(s) on each result
- Presentation and discussion at an ND Sim/Reco meeting

Proposal is to do this in two batches, one ASAP.

TMS Requirements

Requirements:

- Are meant to show flow-down from high-level to technical
- Are meant to be developed *iteratively* and *recursively*

Requirements are *very important* during the review process.

- Reviewers: does this design meet the requirements? They can view their role as assigning a Pass/Fail and take a very legalistic approach.

ND-LAr chapter has a large number of low-level technical requirements

- Feel free to ADD technical requirements!!!

Let's have two focused meetings in the coming weeks:

Requirements/QA/QC/Calibration

Next DUNE Collaboration Meeting

Week of Jan 27-31, CERN. The week before our PDR.

How do we want to use this time? (Or do we?)

- + Opportunity to get people together
- Overhead of travel time

In my opinion, every time we've managed to get a critical mass of people involved in the TMS design together in a room for a few hours, good things have happened.

We could use this time to:

- Do practice talks for the review
- Continue discussions on key elements of the design