Fermilab

U.S. DEPARTMENT OF ENERGY | Office of Science

Delivery Ring RF Review Executive Session

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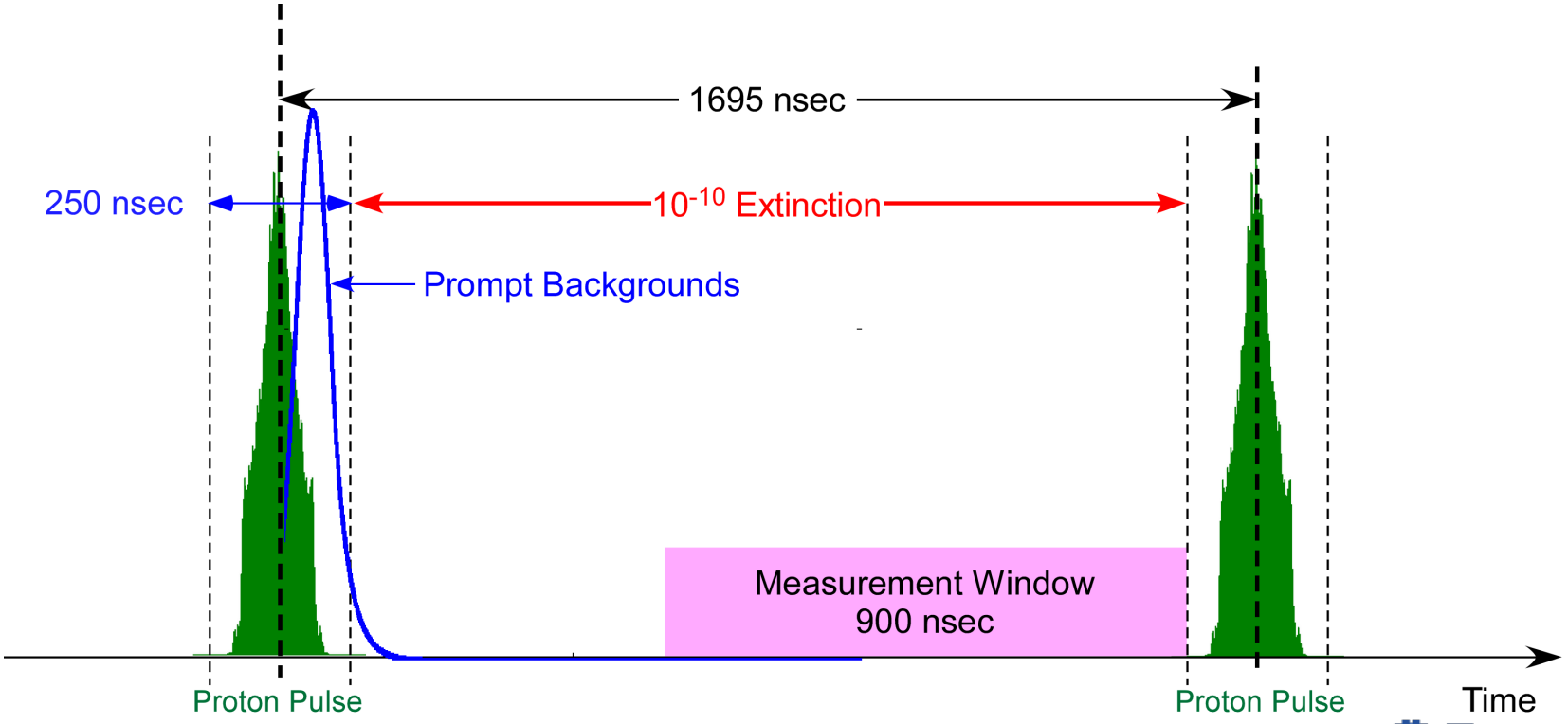
11/19/15

The Importance of RF for Mu2e

- The Mu2e experiment is being built to measure the extremely rare process of muon to electron conversion (details in next talk)
- The sensitivity of the experiment depends on the structure of the proton beam delivered to the Mu2e target
- The RF systems play a significant role in establishing this structure



Scope of Mu2e RF

- Most of the RF systems upgrades necessary for Mu2e are being designed and built by projects other than Mu2e
- The Mu2e Delivery Ring RF upgrade is a Level 3 sub-project of Mu2e. It is principally responsible for the design and fabrication of the low level system for the Delivery Ring 2.36 MHz RF system
- Thus, the primary focus of this review is on the technical design of the Delivery Ring Low Level RF system

Charge

We would like the committee to address the following questions:

1. Is the technical design of the Mu2e Delivery Ring Low-Level RF System technically sound? Have all the principle issues of the Recycler to Delivery Ring transfer process been appropriately evaluated, simulated, and calculated? Are all of these issues properly addressed in the design?
2. What are the technical risks of the design? Have all of the technical risks associated with Mu2e Delivery Ring RF System been accounted for? Have these risks been properly evaluated and mitigated?
3. In particular, will the Low Level RF System be configurable to accommodate the beam studies necessary for Mu2e commissioning and normal beam operations?
4. Is the technical design of the Mu2e Delivery Ring RF System on track to satisfy the requirements for a DOE CD-3c review in early CY 2016?

We would like the committee to submit a written report of its findings, comments, and recommendations within two weeks of the conclusion of the review.

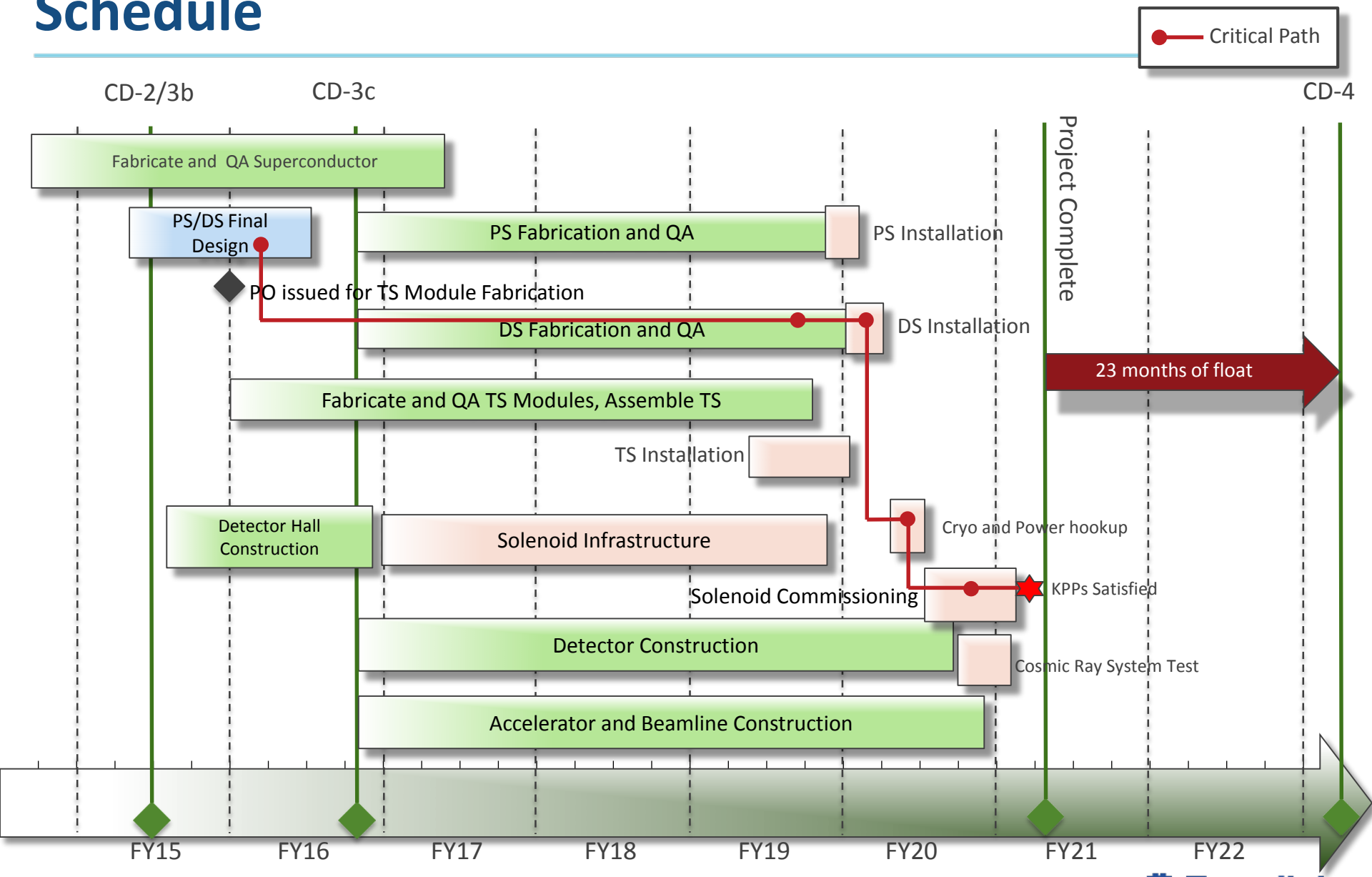
Design Maturity

- Next spring the Mu2e project will be asking for CD-3 approval for most of the project to begin the implementation phase.
- For CD-3 approval, all designs do not have to be final, but they do need to be
  - Mature
  - There must be a plan for completing the design
  - The risks associated with the remaining design must be small
- For the Delivery Ring RF sub-project
  - We believe the design is nearly complete
  - Procurements for the fabrication of this system are scheduled to begin in early FY17

Schedule

- Previous Mu2e CD approvals:
  - CD-0 November 2009
  - CD-1 July 2012
  - CD-3a July 2014 (CD-3a for superconductor construction)
  - CD-2/3b March 2015 (CD-3b for Mu2e building construction)
- CD-3c DOE review scheduled for next summer
  - Timing of CD-3c is based on when the solenoids are ready, but other components have to be mature on that timescale as well.
- Installation of the Delivery Ring RF system needs to be completed prior to M4 beamline commissioning in early CY2020

Schedule


Critical Path
CD-2/3b
CD-3c
CD-4
Project Complete
Fabricate and QA Superconductor
PS/DS Final Design
PS Fabrication and QA
PS Installation
PO issued for TS Module Fabrication
DS Fabrication and QA
DS Installation
23 months of float
Fabricate and QA TS Modules, Assemble TS
TS Installation
Detector Hall Construction
Solenoid Infrastructure
Cryo and Power hookup
Solenoid Commissioning
KPPs Satisfied
Detector Construction
Cosmic Ray System Test
Accelerator and Beamline Construction
FY15
FY16
FY17
FY18
FY19
FY20
FY21
FY22

Thank You

- Thank you for helping us to assure that we have a workable, robust design.
- Peer review is an important part of this process.
- A written report with your comments and recommendations within 2 weeks will be very helpful.