

Mu2e Target, Remote Handling, and Heat & Radiation Shield Technical Review Charge

The Mu2e project has recently received CD-2/3b approval from the DOE (March 2015). The project is in the process of completing its final design and is making preparations for a CD-3c DOE review in 2016. Peer reviews of key technical elements of the project are an important part of this process.

The Mu2e target station elements that are the subject of this review are the Production Target, the Heat and Radiation Shield, and the Target Remote Handling System.

- The Mu2e Production Target is located inside the Production Solenoid, the first of the three superconducting solenoids. The remaining two solenoids are the Transport Solenoid, containing the secondary muon beam transport, and the Detector Solenoid, which houses the tracker, calorimeter and other detectors.
- The Heat & Radiation Shield is installed inside the bore of the Production Solenoid and protects the Production and Transport Solenoids from the thermal and particle radiation produced by the interaction of the primary proton beam with the target.
- The Mu2e proton target remote handling system provides a system whereby the highly radioactive proton target can be replaced by remote control. This system also provides the means by which the proton target is initially installed. The remote handling system must be capable of accessing and replacing the target and re-sealing the vacuum system after a new target is installed. The remote handling system must also be capable of replacing a thin foil membrane situated across the aperture of the Heat & Radiation Shield that is used to absorb anti-protons.

We expect that the radiation damage to the aluminum stabilizer in the Production Solenoid coil will require an annual magnet warm-up for annealing to recover the conductivity. This combined with an approximate time of one month to replace the target, sets the desire to replace the target at most once per year.

Further technical details of this equipment can be found in the Mu2e Technical Design Report and other material that can be obtained from the review website.

We would like the committee to address the following questions:

1. Are the designs of the Proton Target, the Heat and Radiation Shield, and the Target Remote Handling System technically sound?
2. What are the technical risks associated with each design? Have these risks been properly evaluated and mitigated?
3. Is the design sufficiently mature to start pre-production prototyping?
4. Is the technical design on track to satisfy the requirements for a DOE CD-3 review in early 2016?

The review is scheduled for November 16-18. 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.