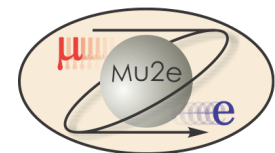




U.S. DEPARTMENT OF
ENERGY Office of
Science

KPPs and Off-Project Installation Activities

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Key Performance Parameters (Draft)

Key Parameters	Threshold Performance	Objective Performance
Accelerator	All accelerator components in the M4 beamline upstream of the M4 diagnostic absorber, and all RF and resonant extraction components in the Delivery Ring are installed and operational at nominal voltages and currents. Fabrication of all target station components complete.	Protons are delivered to the diagnostic absorber in the M4 beamline. Proton target beam absorber installed. Heat and Radiation Shield installed inside of the Protection Solenoid. Proton target fabricated and delivered to Fermilab.
Superconducting Solenoids	The Production, Transport and Detector Solenoids have been installed in the Mu2e Detector Enclosure and are ready to be cooled and powered.	The Production, Transport and Detector Solenoids have been cooled and powered to their nominal field settings.
Detector Components	Cosmic rays are observed in the Tracker, Calorimeter and Cosmic Ray Veto after they are installed in their garage position.	Cosmic ray tracks are observed in the Tracker Calorimeter and Cosmic Ray Veto and acquired by the Data acquisition system after they are installed in the garage position.

- Still under discussion with DOE.
- Threshold parameters define minimum accepted outcome for CD-4
- Objective parameters are the desired outcome for CD-4.
- Objective parameters are fully costed in baseline.
- Cost difference between Threshold and Objective performance ~ \$1M.

Off-Project Installation

- The solenoid fields are specified at the percent level. The fields must be validated to this level as part of our acceptance criteria.
- To achieve the momentum resolution required to obtain the best possible physics results, the field in the tracker region must be known to high precision.
 - High-precision, fine-grained field maps required at 100%, 70% and 50% of nominal field strength.
 - High precision map is performed off-project. Not required to satisfy KPPs
 - Will take several months.
 - Detectors cannot be installed inside DS while mapping is being performed.
 - Downstream neutron shielding/Cosmic Ray Veto Counters cannot be in the way either
 - Final insertion of detectors inside DS is off-project.

Off-Project Installation

- To optimize transmission of muons to the stopping target and to properly simulate muon transmission, the field lines in the PS and DS must be optimized and known.
 - Some adjustability of coils built into TS design
- Not necessary to satisfy KPPs.
- To map out the PS/TS field lines and to optimize transmission, a movable electron source will be placed at the location of the production target.
- Production target, pbar window, stopping target, neutron shielding, CRV cannot be in place during test.
 - Neutron shielding and CRV preclude TS coil adjustment.
 - Implies that these are all installed off-Project.

Off-Project Installation

- To summarize, once the precision measurements of the solenoid fields have been completed, the following activities remain before the apparatus is ready for beam.
 - Insertion of stopping target, proton absorber, Tracker, Calorimeter into DS
 - Installation of Stopping Target Monitor downstream of DS.
 - Installation of pbar window(s)
 - Installation of production target
 - Installation of vacuum system endcap enclosures
 - Installation of neutron shielding around TS and DS
 - Installation of CRV.
 - Installation of shield blocks in hatches
 - Commissioning of detector in vacuum.
- These activities will take > 1 year.
- Accelerator commissioning to the diagnostic beam dump can proceed in parallel with these activities.
- Operations schedule with links to project schedule developed in P6 (but not costed as part of Project)