Mu2e-II Radiation Mitigation and Simulation Working Group

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Items that can be discussed at Snowmass21 (studies needed):

1. Target Station for pion-production target (LDRD): bent conveyor and rotated target options; are there alternative target stations to consider for Mu2e-II (liquid, disk, …) ? Heat and Radiation Shield (re-use after Mu2e, superconducting (SC) coil protection).
2. Muon beamline and Detector Solenoid radiation quantities: DPA, absorbed dose. New levels: due to the increased beampower (and muon flux thereof) radiation damage of SC coils can become an issue (a study is needed).
3. Shielding assessment: 1) prompt dose in habitable premises of the Muon Campus, 2) residual dose in the PS and DS halls, 3) prompt dose above PS hatch and DS hatch, 4) skyshine.
4. Activation and replacements of targetry, activation of HRS after Mu2e, requirements and levels for personnel access.

Codes to be used: framework (MM), FLUKA (SM), MARS15 (VP), MCNP6 (HZDR)

Current activities (Mu2e-II target)

- The first 42-cm-long carbon bent model developed by LDRD has been implemented in framework by M.MacKenzie
- Preliminary muon stopping rates 8.7(9) E-5 stops/p (framework) can be compared with the MARS15 result for the same target 5.75(7)E-5 stops/p
- Implementing in FLUKA (S.Mueller) and MCNP6. Stefan has started FLUKA/MCNP6 comparisons for a rod target (no magnetic field). Bent target model handed over to Stefan.
- LDRD: rotated rod target and granular target models are being studied during FY21 (with feedbacks from thermal analysis), target models will be handed over to Sensitivity group
- LDRD: bent target will be optimized (shape, position) and handed over to Sensitivity group for update. Hardware in the HRS bore will be modeled and optimized in MARS15 and handed over to Sensitivity group