



Contribution ID: 51 Contribution code: TUMR011

Type: **Poster Presentation with Mini Oral**

Building the backbone: cable plant planning, design, and progress for SLAC's MEC-U project

Tuesday 23 September 2025 15:30 (3 minutes)

The Matter in Extreme Conditions Upgrade (MEC-U) is a Department of Energy (DOE) Fusion Energy Sciences (FES) funded project slated for construction at the SLAC National Accelerator Laboratory later this decade. The facility will deliver the Linac Coherent Light Source (LCLS) X-ray Free Electron Laser (XFEL) beam to an experiment target chamber, coordinated with two high-power laser systems: a high-energy, long-pulse (HE-LP) laser and a rep-rated laser (RRL), built by the Laboratory for Laser Energetics (LLE) and Lawrence Livermore National Laboratory (LLNL), respectively.

Designing the cable plant for MEC-U —which encompasses rack and tray layouts, cable specifications, penetrations, and grounding —presents a unique set of technical challenges and learning opportunities for the Experiment Control Systems (ECS) team. The design must be robust against high levels of electromagnetic interference (EMI) generated within the experimental target chamber and laser systems while also accommodating extensive cable lengths throughout the facility. It must also strike a careful balance between an accelerated facility schedule and lagging technical design readiness.

This talk will highlight key challenges, current mitigation strategies, and the progress made to date in the MEC-U cable plant, as well as outline the roadmap ahead as we support the next frontier of high-energy fusion science.

Footnotes

Funding Agency

BES

Manuscript formatting

Microsoft Word (docx)

Author: CABRAL, Mitchell (SLAC National Accelerator Laboratory)

Presenter: CABRAL, Mitchell (SLAC National Accelerator Laboratory)

Session Classification: TUMR Mini-Orals (MC03, MC04, MC08)

Track Classification: MC04: Hardware Architecture and Synchronization