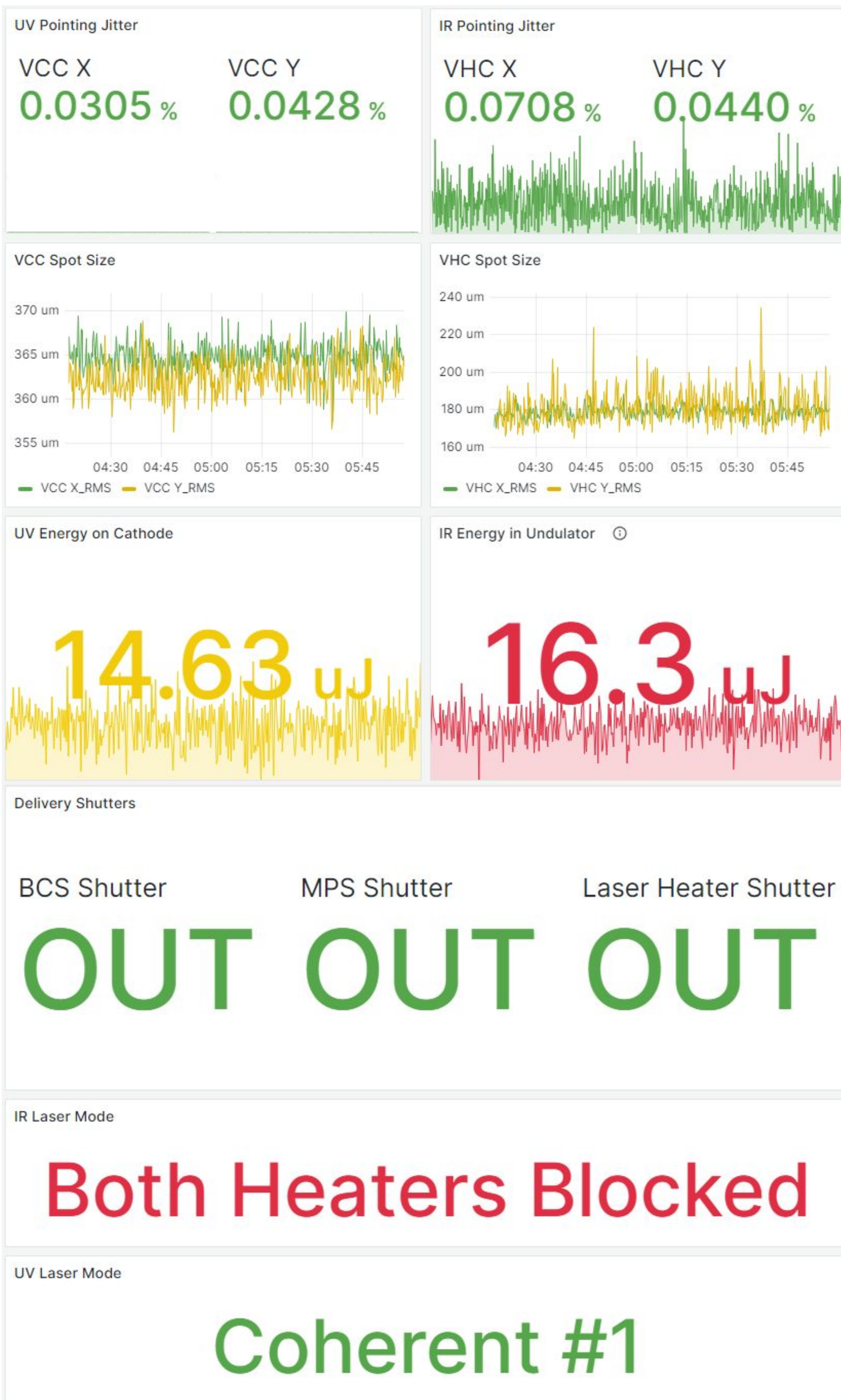


Operational Analysis at the LCLS-I Photoinjector Laser

Ben Armentrout, SLAC National Accelerator Laboratory

Grafana Dashboard

- Pre-existing GUI does not show important data in user friendly format
- Grafana dashboard allows operators to easily see key beam characteristics from any computer
- Automated text alerts can quickly inform operators if beam characteristics change in order to reduce downtime



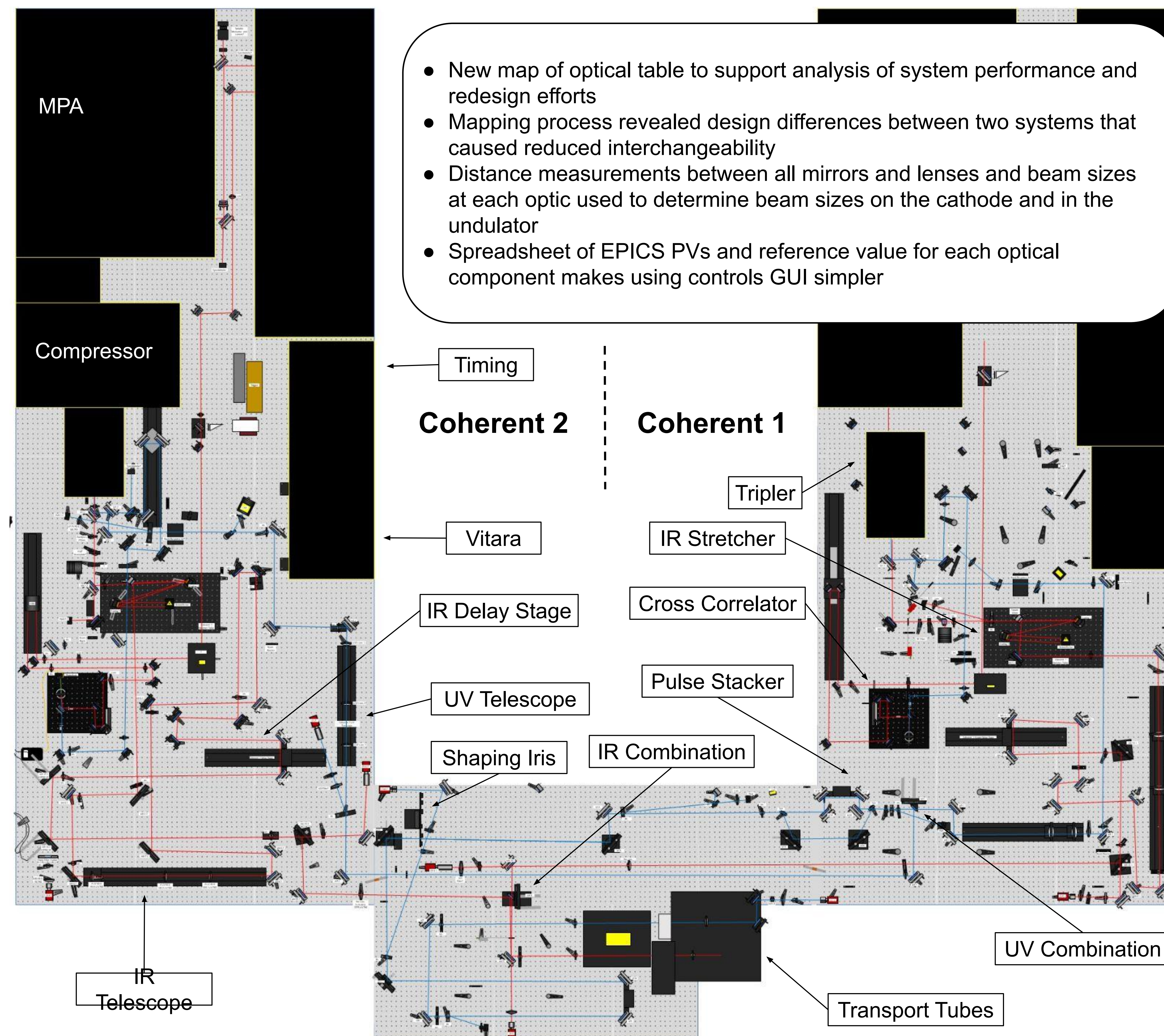
Automation Projects

- Moving motors with GUI is tedious, can take all day after power outage
- New python script can set all PVs to a saved reference
- Machine Learning model for heater beam drift reduction in development

SLAC's Most Important Laser Lab

- Generates electrons for X-Ray free electron laser
- Two near-identical systems, each with IR and UV beams
- 253nm UV beam strikes copper cathode at 120Hz
- 760nm IR 'heater' beam suppresses e-beam microbunching
- Loss of either UV or IR beam stops all LCLS X-ray experiments

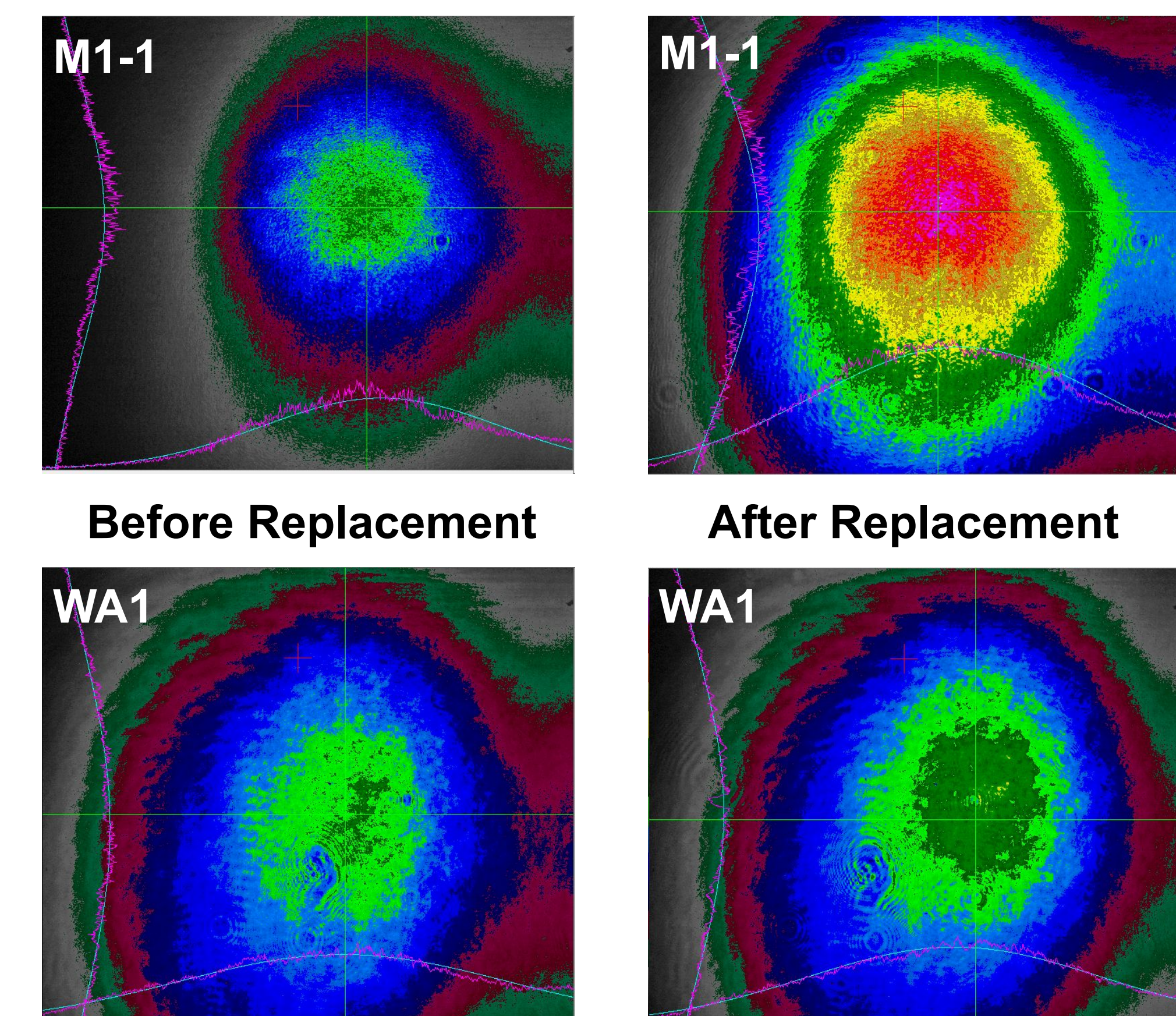
Mapping Documentation



Maintenance and Analysis

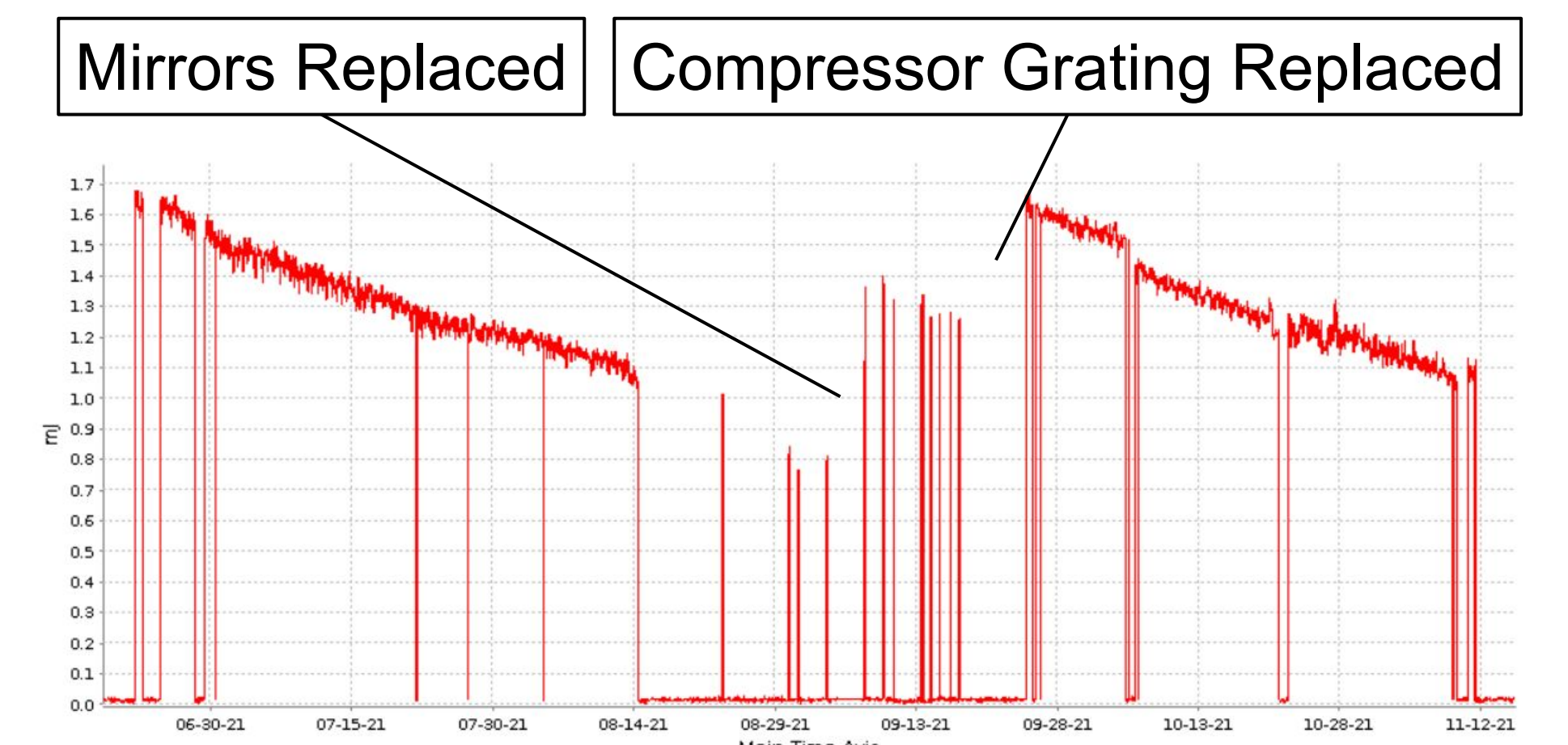
- Optics accrue damage over time, especially from UV
- Optical damage can decrease efficiency and introduce mode quality issues

Damage Surveying



- Damage surveying and historical replacement logs used to establish replacement rates to maintain adequate transport efficiency
- Current inventory and projected replacement rates inform advance optics purchasing to avoid downtime

Historical Energy Levels



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