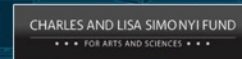


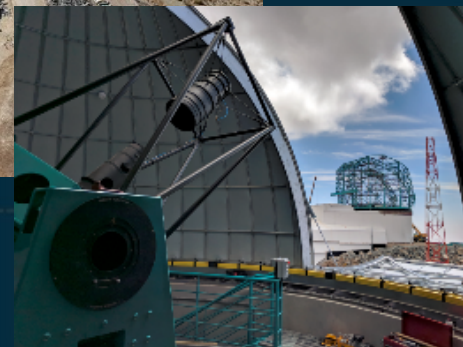


NSF
@ Vera C. Rubin
Observatory

Vera C Rubin Observatory Construction Status

Tucson, AZ 22 January 2020
Dark Energy Science Collaboration





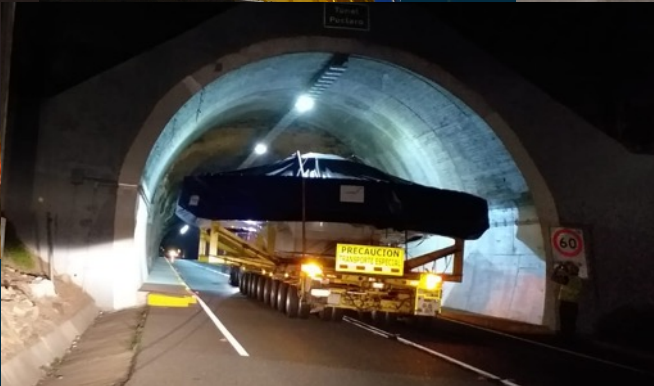
AuxTel under computer control

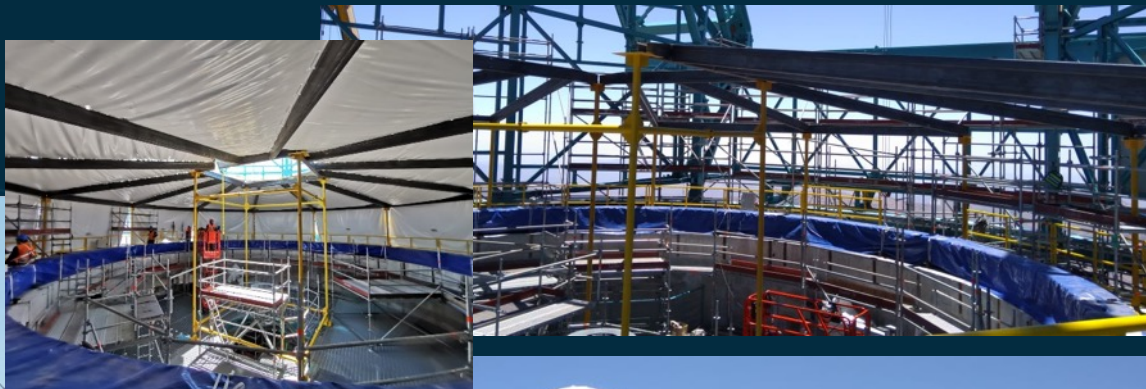
C ← → D



Provisional crane, rotation & cladding





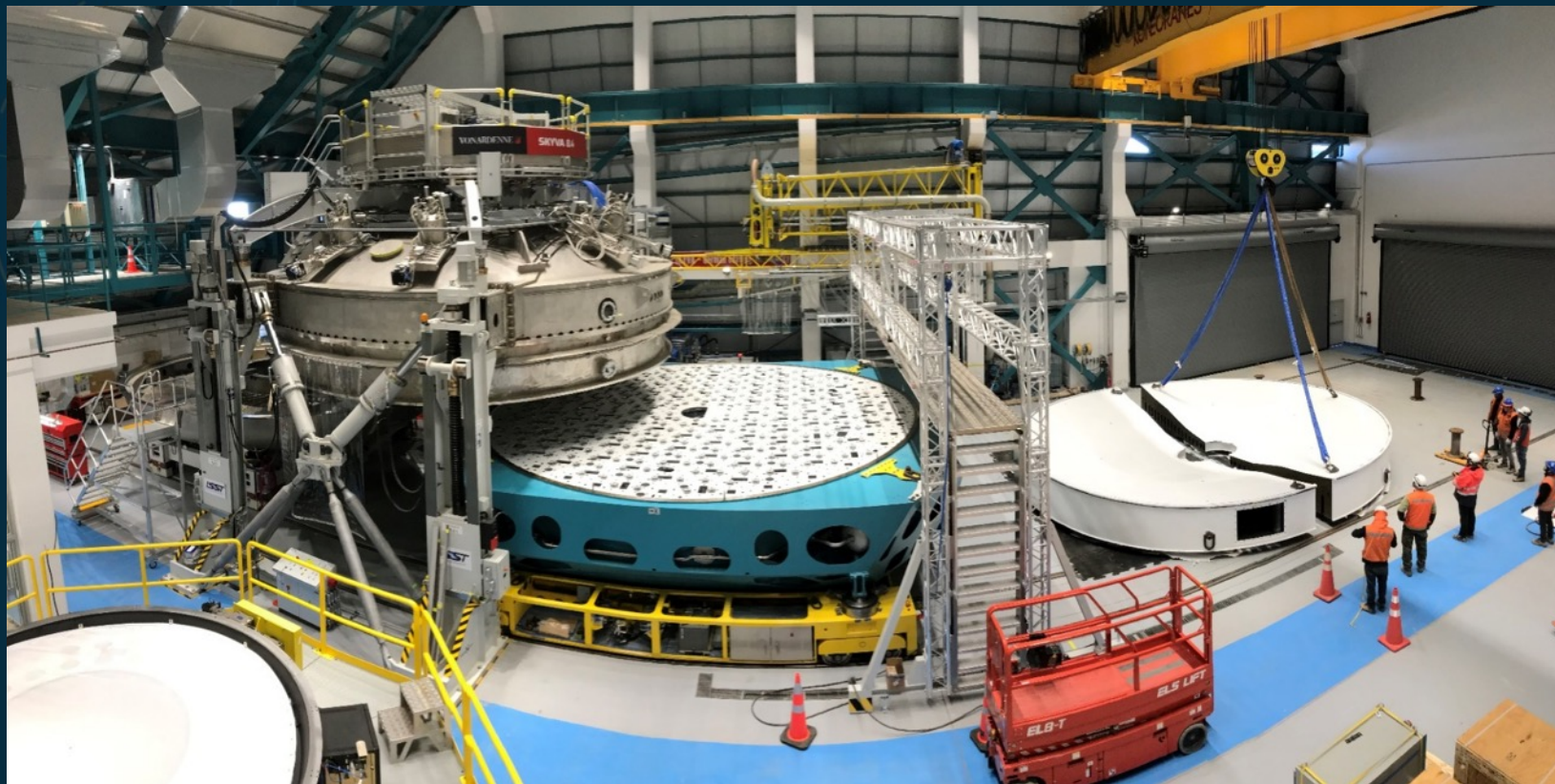


Azimuth track installation completed in December.



500 Ton crane reassembly this week for installation of trunnions in February.



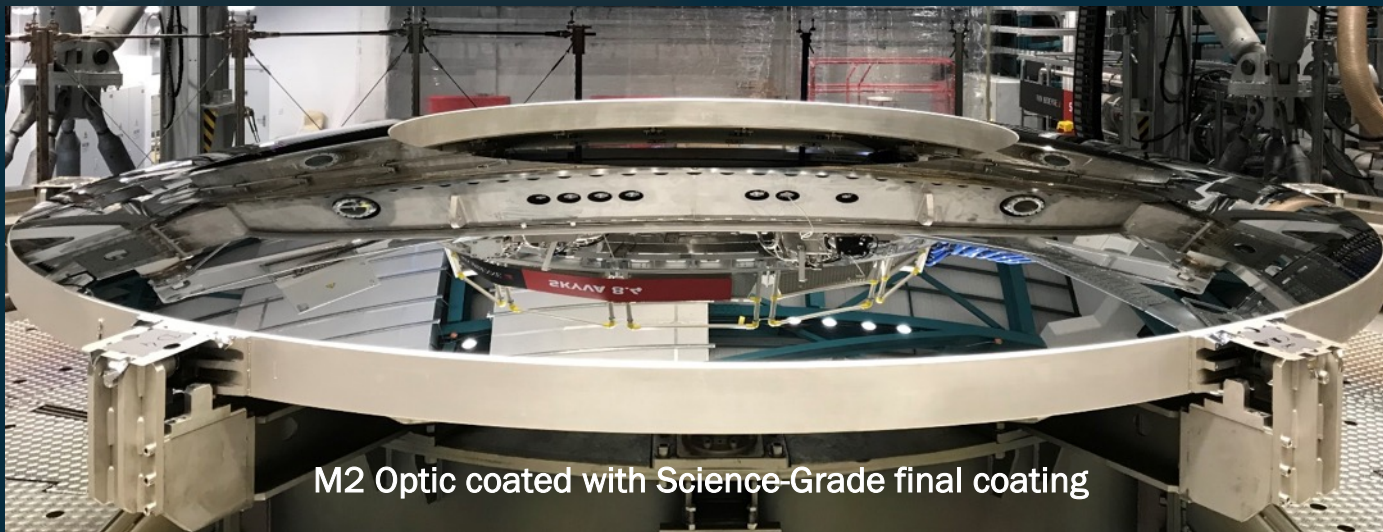
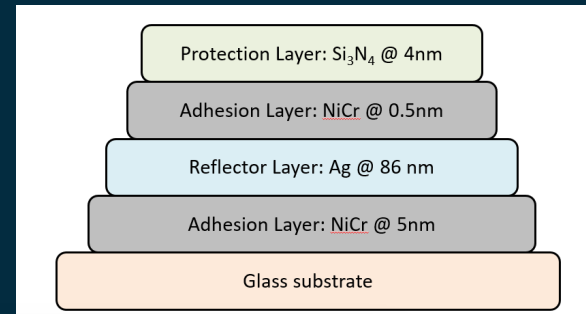




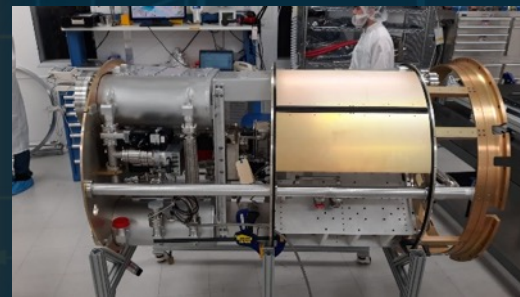
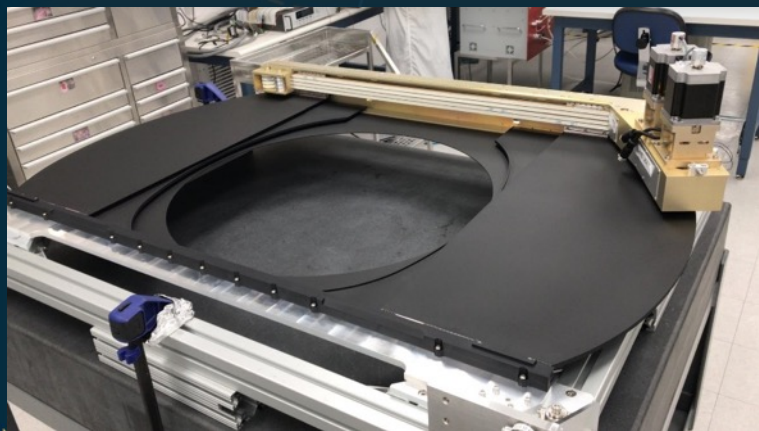
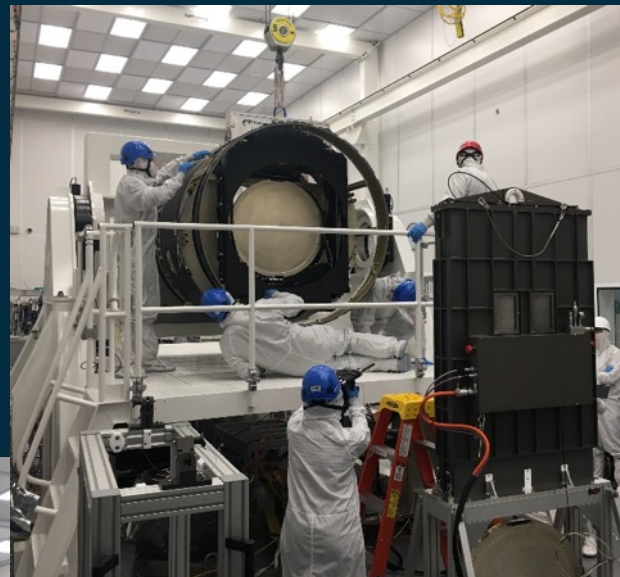
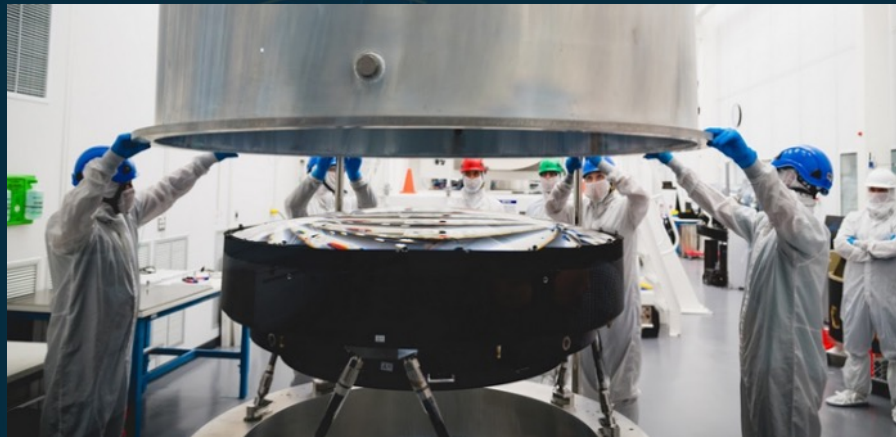
Plasma glowing during coating



M2 Protected
Silver Recipe

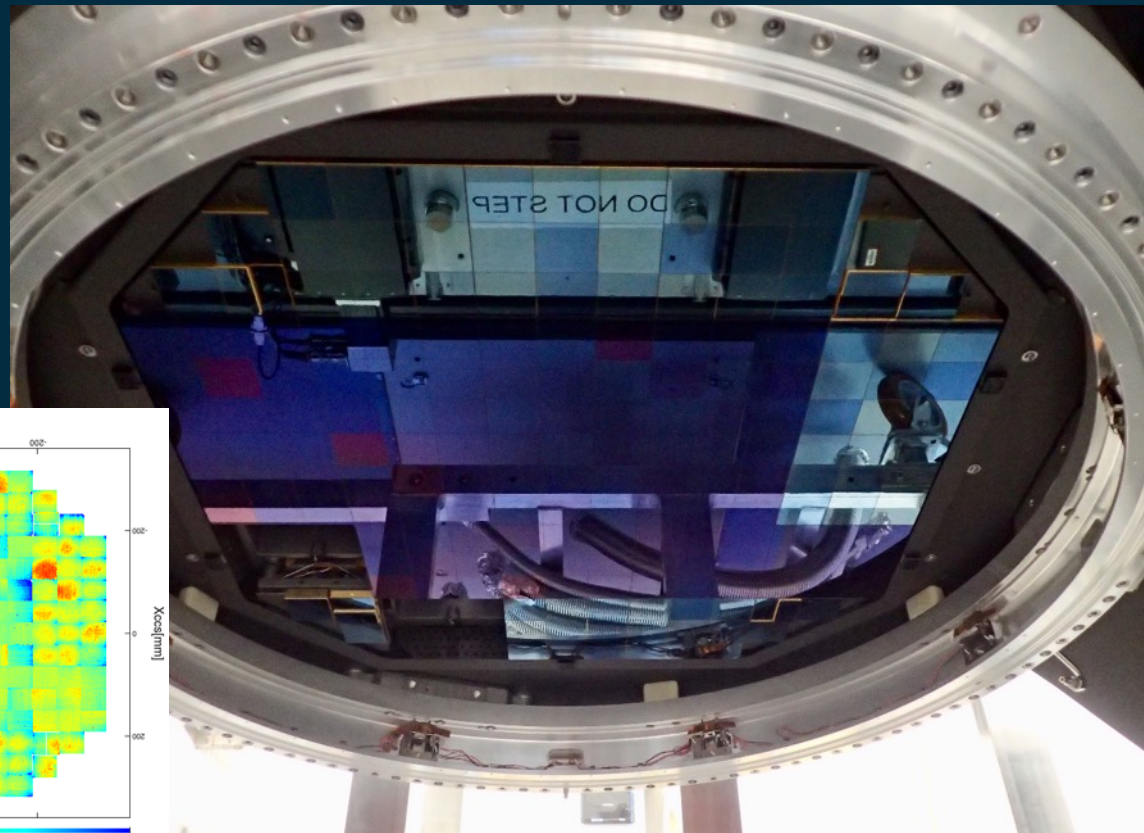


M2 Optic coated with Science-Grade final coating

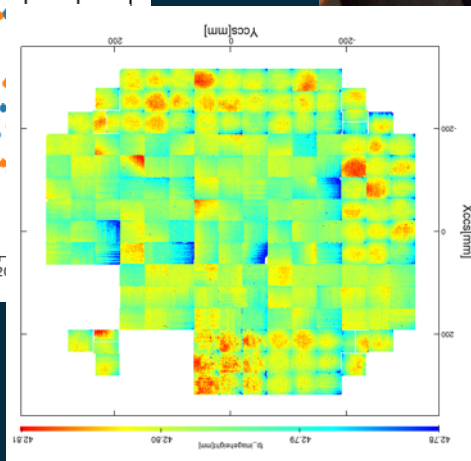
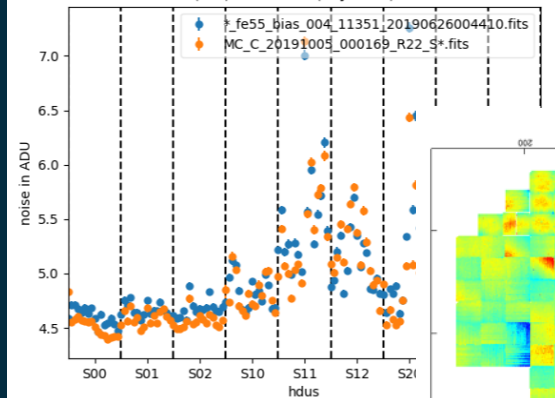


Focal plane assembly is nearly complete

- 19-rafts installed in cryostat
- Cold electro-optical test with 9 completed 11/04/2019
- Full Focal Plane by Jan (success as of last week!)

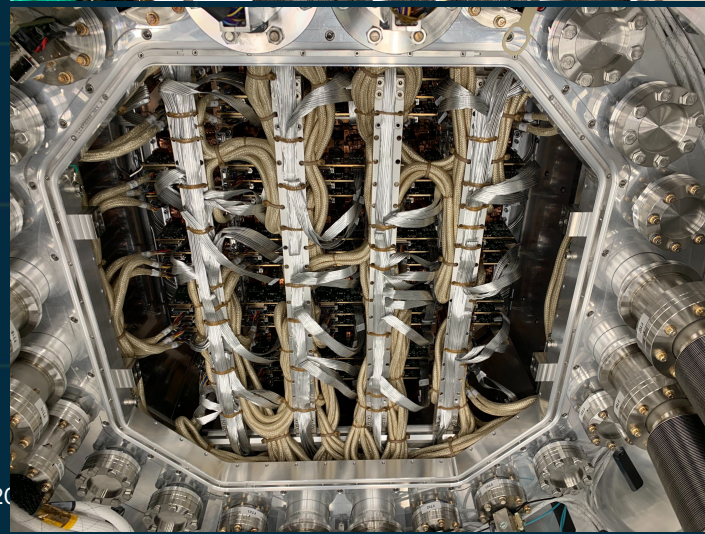
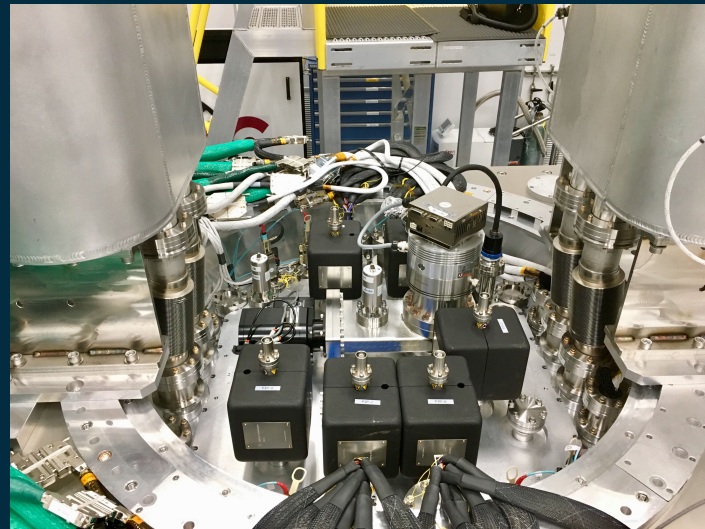
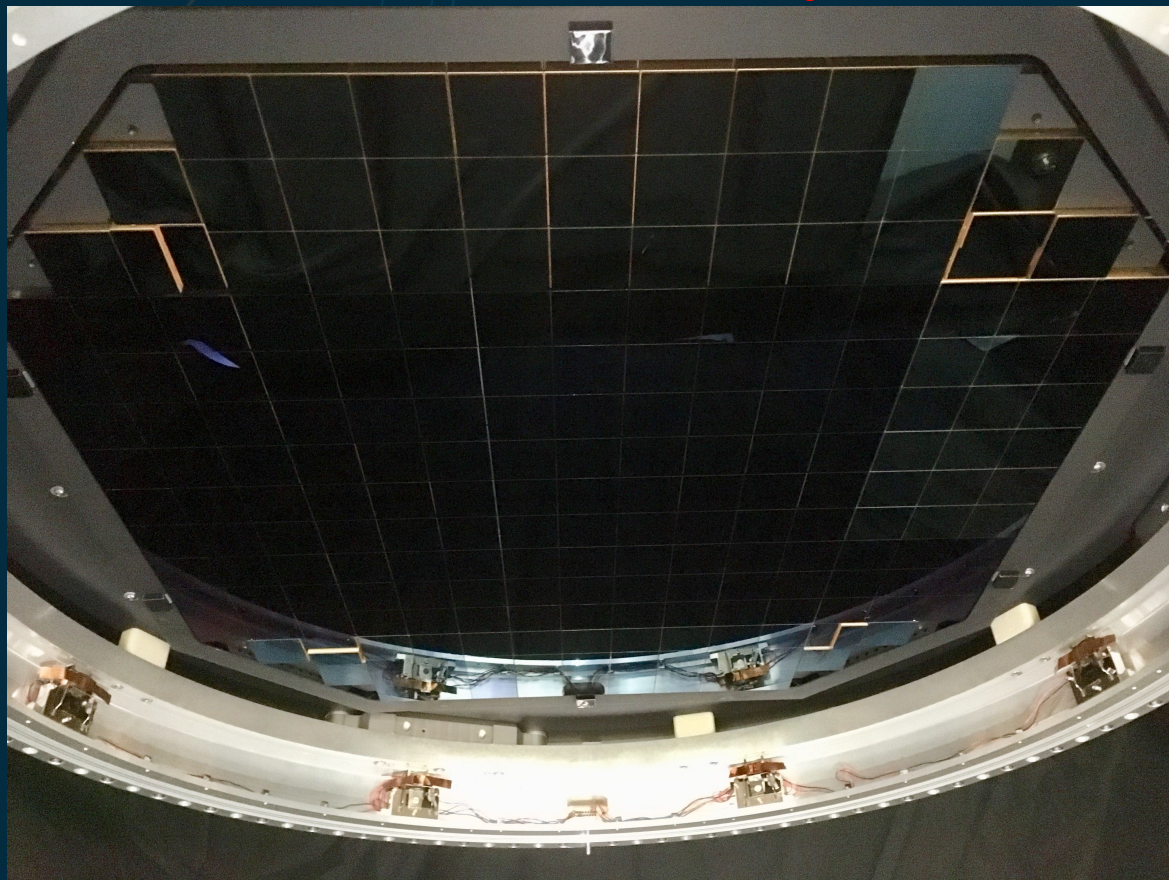


11351 (ts8) vs 6729D (Cryostat) RTM-024



Full focal plane

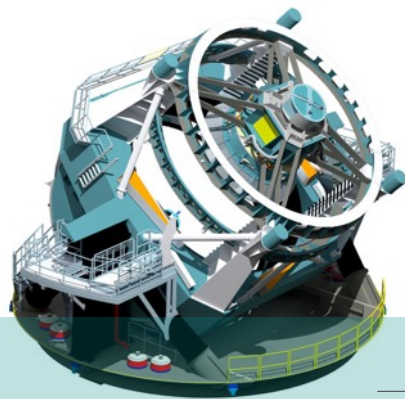
Internal use only



Raw Data: 20TB/night



Sequential 30s images covering the entire visible sky every few days



Access to proprietary data and the Science Platform require LSST data rights

LSST Science Platform

Provides access to LSST Data Products and services for all science users and project staff



Prompt Data Products

Alerts: up to 10 million per night

Results of Difference Image Analysis (DIA): transient and variable sources

Solar System Objects: ~ 6 million

Data Release Data Products

Final 10yr Data Release:

- Images: 5.5 million x 3.2 Gpx
- Catalog: 15PB, 37 billion objects



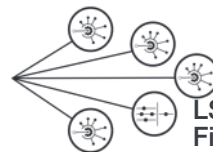
via nightly alert streams



via Prompt Products Database



via Data Releases



Community Brokers

LSST Alert Filtering Service

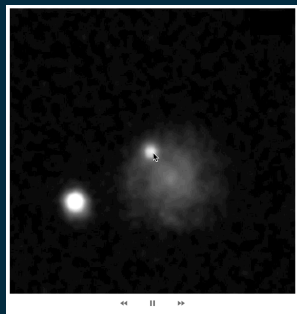
LSST DACs (Chile & NCSA)

Independent DACs (IDACs)

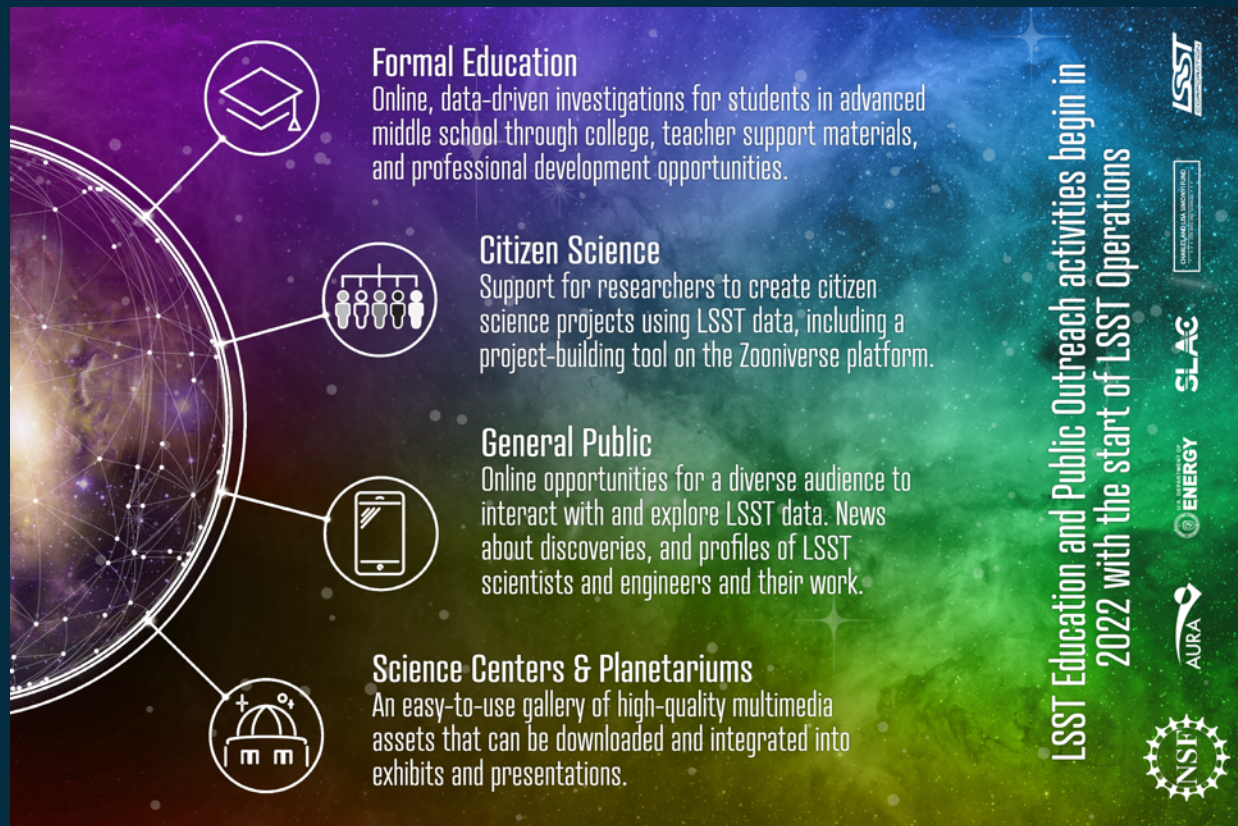




Completing many video assets to support investigation

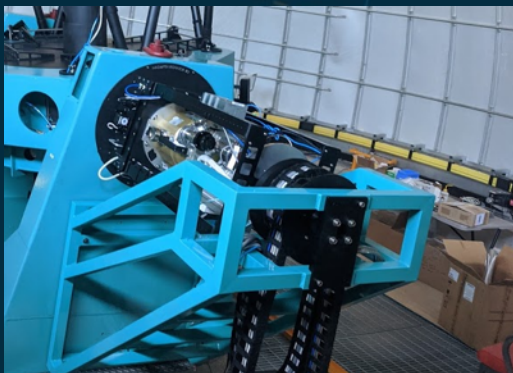


Prototype supernova selector tool with tooling for lightcurves

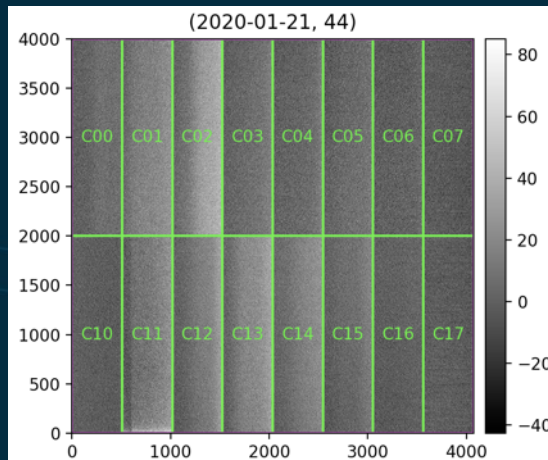




AuxTel Spectrograph arrives in Chile and is ready for installation



AuxTel Spectrograph installed

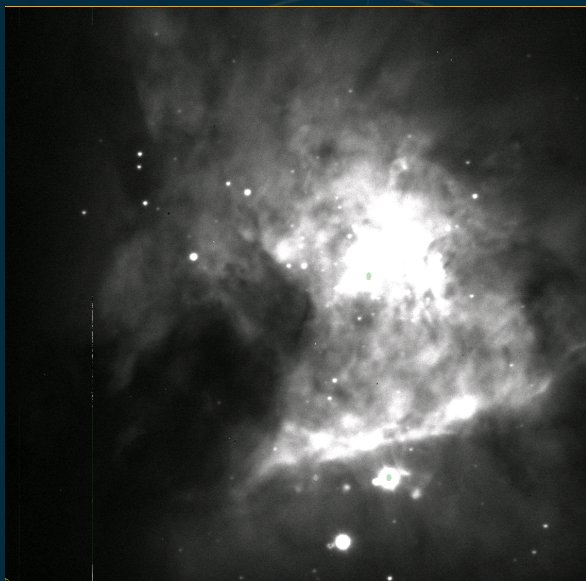


Liveness tests of spectrograph on telescope has been successful with the support and coordination from many people spanning all three technical subsystems

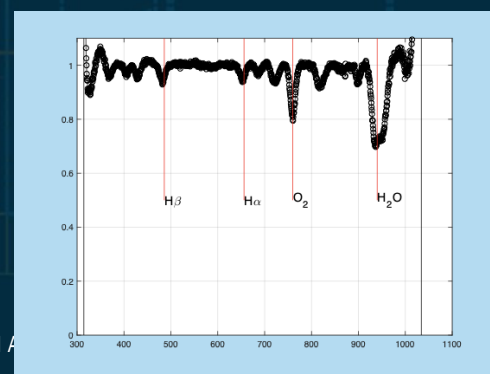
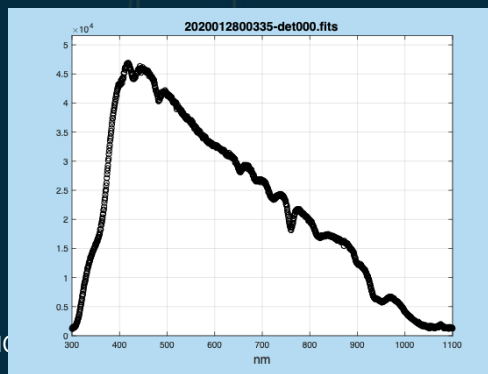
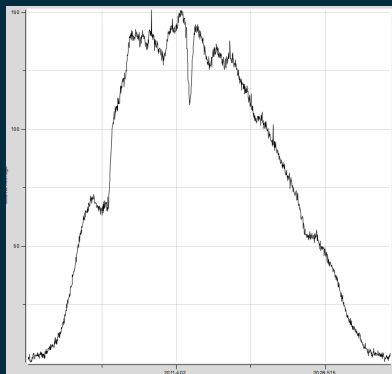
The image at left demonstrated key system functions including:

- Coordination of control between subsystem elements from T&S, LSSTCam and DM
- Command through the Observatory Control System (T&S) requesting the Camera Control System (LSSTCam) to take an exposure from 4k x 4k ITL CCD
- Receiving image data and ingested into the LSST data system (DM) and transferred to NCSA
- Data access to the SIT-Com team through the Science Platform (DM) for analysis

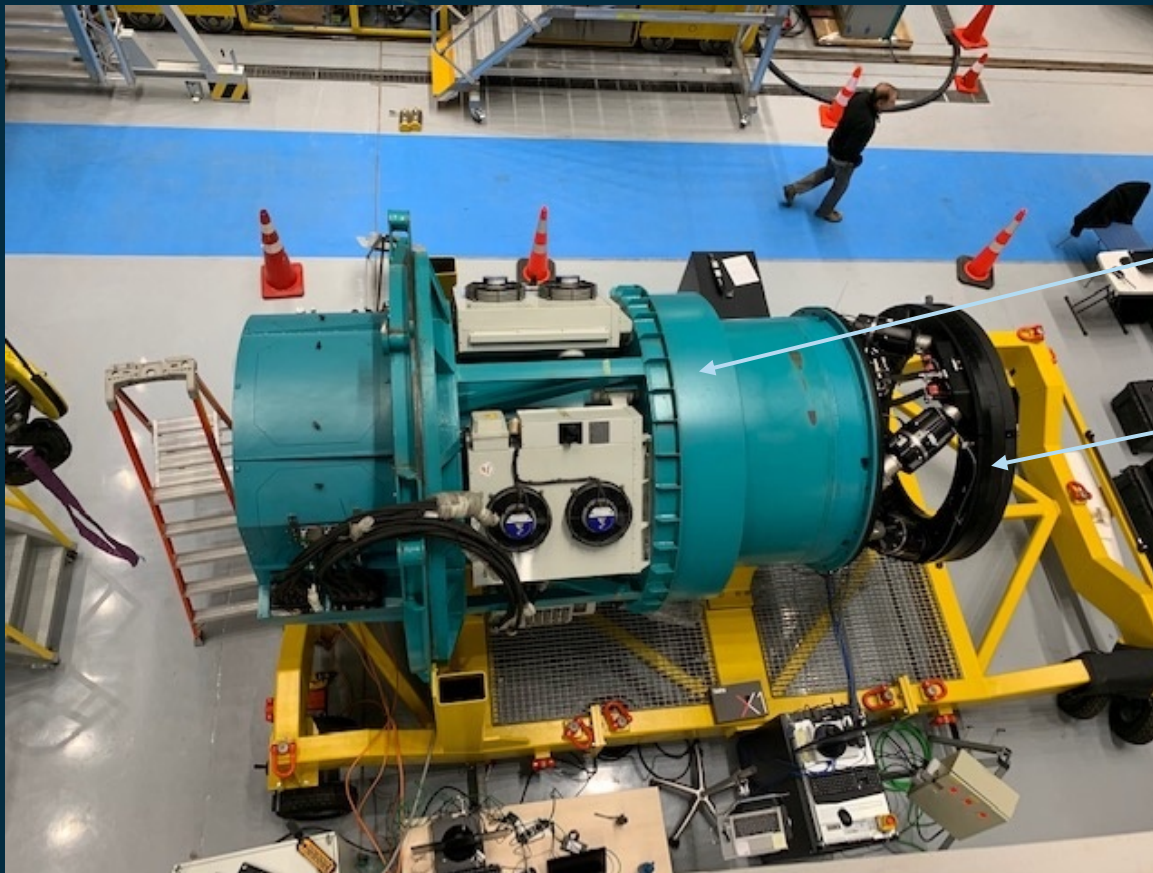
AuxTel First Light



Internal
use only



System Integration Test and Commissioning has begun



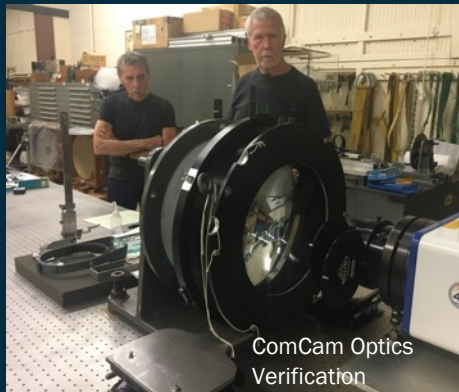
Integrating structure and Camera cable wrap delivered by Telescope vendor

Vendor delivered Camera Hexapod and Rotator

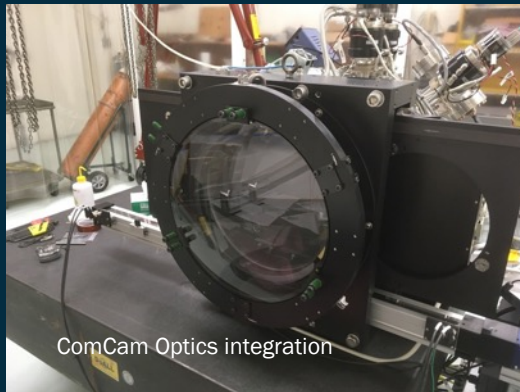
VRO team software and network infrastructure

VRO team engineering and facility database system

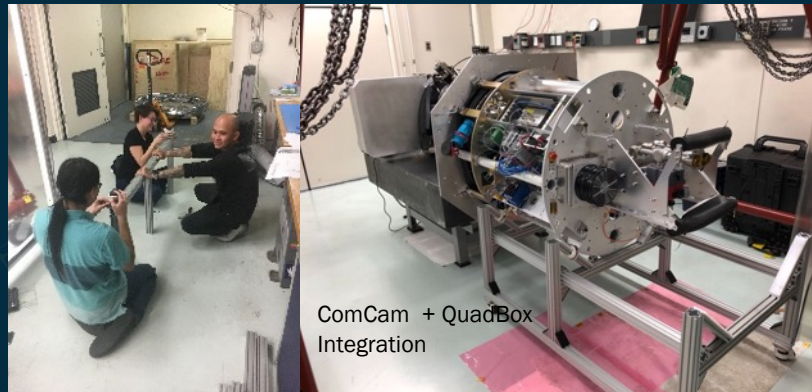
SIT-Com Progress Highlights



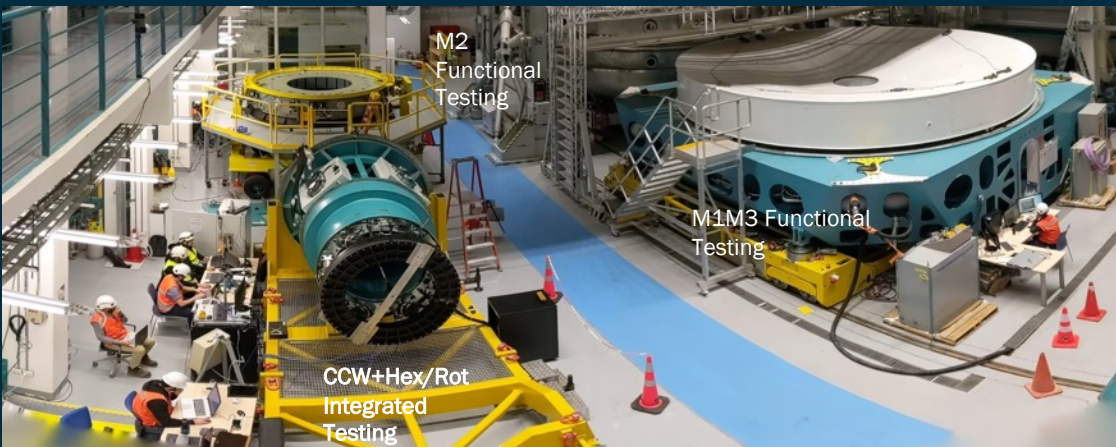
ComCam Optics
Verification



ComCam Optics integration



ComCam + QuadBox
Integration



M2
Functional
Testing

M1M3 Functional
Testing

CCW+Hex/Rot
Integrated
Testing

ComCam Integration
← Camera Cable Wrap + Hex/Rot Integration
with M2 & M1M3 testing



Camera refrigeration
cold-compressor
cabinet integration
←

Key Project Dates:

Formal Project Dates

CD-1 : 11 April 2012

CD-2 : 7 January 2015

CD-3 : 27 August 2015

CD-4 : 15 September 2020

FDR : 5 December 2013

MREFC Start : 1 August 2014

MREFC End : 30 September 2022

Key Project Dates to Operational Readiness

- Cryostat ready for integration : 19 Feb 2020
- Commissioning Camera on Site : 6 March 2020
- Telescope Mount Assembly Integrated : 17 June 2020
- Camera Ready at SLAC : 19 February 2021
- Engineering First Light : May 2021
- System First Light : Nov 2021



- On-sky commissioning of AuxTex Spectrometer – Starting Jan 2020 (e.g. now)
- Phase 2 integration testing of the Camera Cable Wrap + Hex/Rot following software modifications – February 2020
- Final integrated tests of ComCam in Tucson – February 2020 (shipping scheduled end of Feb)
- M2 cell testing with updated SAL software and functional tests in preparation for TMA integration – March-April 2020
- Reception of ComCam in Chile – March 2020
- ComCam re-verification tests in Chile – March-April 2020
- Integration of ComCam with Hex/Rot + Camera Cable Wrap on cart – April 2020
- Startup of Camera refrigeration pathfinder on cart through Camera Cable Wrap – April 2020
- TMA Top-End Assembly integration with M2 hexapod April/May 2020
- Initial integrated AOS control testing – June 2020



Construction of the NSF Vera C. Rubin Observatory and the DOE LSST Camera are going well.

- Significant progress has been made this past year
- Continues to meet our technical requirements to support the Science Requirements Document
- Have had schedule delays and additional costs
- Some budget and schedule contingency now allocated to the baseline plan
- Optimization and shortening of commissioning effort is being coordinated with Agencies, Operations, & Community





SIT-Com Plan: Post LCR-2045



Time



Early System Integration
& Test w/ComCam

Full System Integration
& Test w/LSSTCam

Science
Verification/Validation

3 months

Technical I&T with ComCam

Engineering verification: Active
Optics, calibration &
instrument signature removal

3 months

Technical I&T with LSSTCam

Engineering verification: Active
Optics, calibration &
instrument signature removal

2 months

Survey 1: Wide Area

Template Generation

2 weeks

Survey 2: Full Depth

10-year survey in selected
reference fields with external
imaging and spectroscopy

4 weeks

Survey 1: Wide Area

Real time Alert Production

2 weeks

- 3 months of technical I&T with ComCam
 - Required verification of system interfaces
 - System software integration & data transport to NCSA
 - Commissioning the LSSTCam refrigeration system
- 3 months of technical I&T with LSSTCam
 - Re-verification of interfaces, software and data transport
 - LSSTCam startup on the TMA – vacuum, refrigeration, utilities, SW, etc...
- 2 months of on-sky performance and science verification

Thank you!

www.lsst.org
www.vro.org



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