Logistics

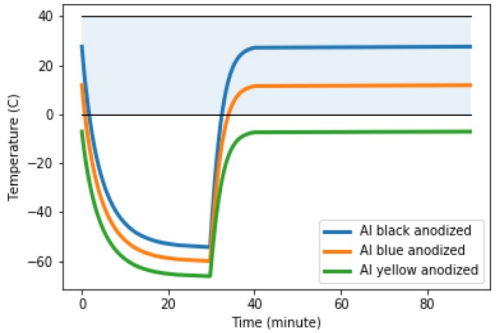
9:00-9:45 Željko Ivezić: Rubin Construction Updates
9:45-10:30 Robert Szabo: The Hungarian In-Kind Contribution
10:30-11:00 Coffee break
11:00-11:45 Saša Simić: Regional storage support for LSST related science
11:45-12:30 Luka Popović SER-SAG in-kind contribution
12:00-13:00 Lunch
13:00 – 17:00 Excursion to the National Park Plitvice
17:00-17:30 Tomislav Jurkić: Supercomputer Bura as LSST in-kind contribution
17:30-17:50 Andreja Gomboc: The Status of Slovenian In-kind Contribution
17:50-18:10 Coffee break
18:10-18:30 Lovro Palaversa and Alex Razim: TVS Dash
18:30-19:00 Discussion: implementation of in-kind contributions, classification, periodicity pipeline, computer resources, TVS Dash, etc.
19:00-21:00 Workshop Dinner

Dinner Highlights

Is the side of the piglet facing heat (fire) warmer than the other one?

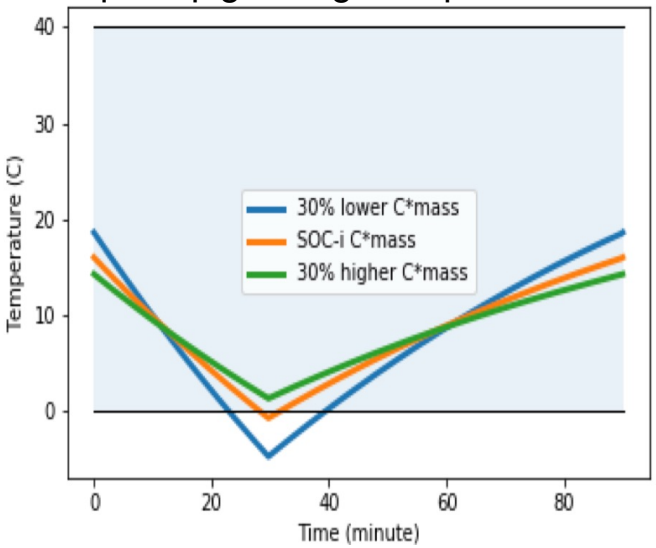
The angular rotation speed is important indeed – it has to be higher than some minimal speed!

Is the side of the piglet facing heat warmer than the other one? No!



LEFT: vanishing thermal inertia (or slow piglet rotation)

BELOW: realistic thermal inertia and adequate piglet angular speed



- as the thermal inertia increases, the temperature curves are becoming more **linear** (the forced boundary condition is the driver)
- the same effect can be induced decreasing orbital time for a satellite, or increasing the rotation speed for the piglet
- in order for the piglet mean surface temperature not to oscillate too widely, the rotation speed must exceed some threshold
- **the mean temperature is the same on both sides (because temperature variation is linear!)**

Outline

- Construction progress: high points
- Anticipated schedule to completion
- Operations preparations

Project and Community Workshop 2022

Leadership changes and updates

UC Berkeley College of Letters & Science @UCBLettersSci · Aug 13, 2021

Meet the next Dean of the Division of Mathematical & Physical Sciences, Professor Steven Kahn:

ls.berkeley.edu/news/next-dean...

Rubin Director's Office Announcement

Sandrine Thomas
Deputy Director for Rubin Construction for AURA/NSF

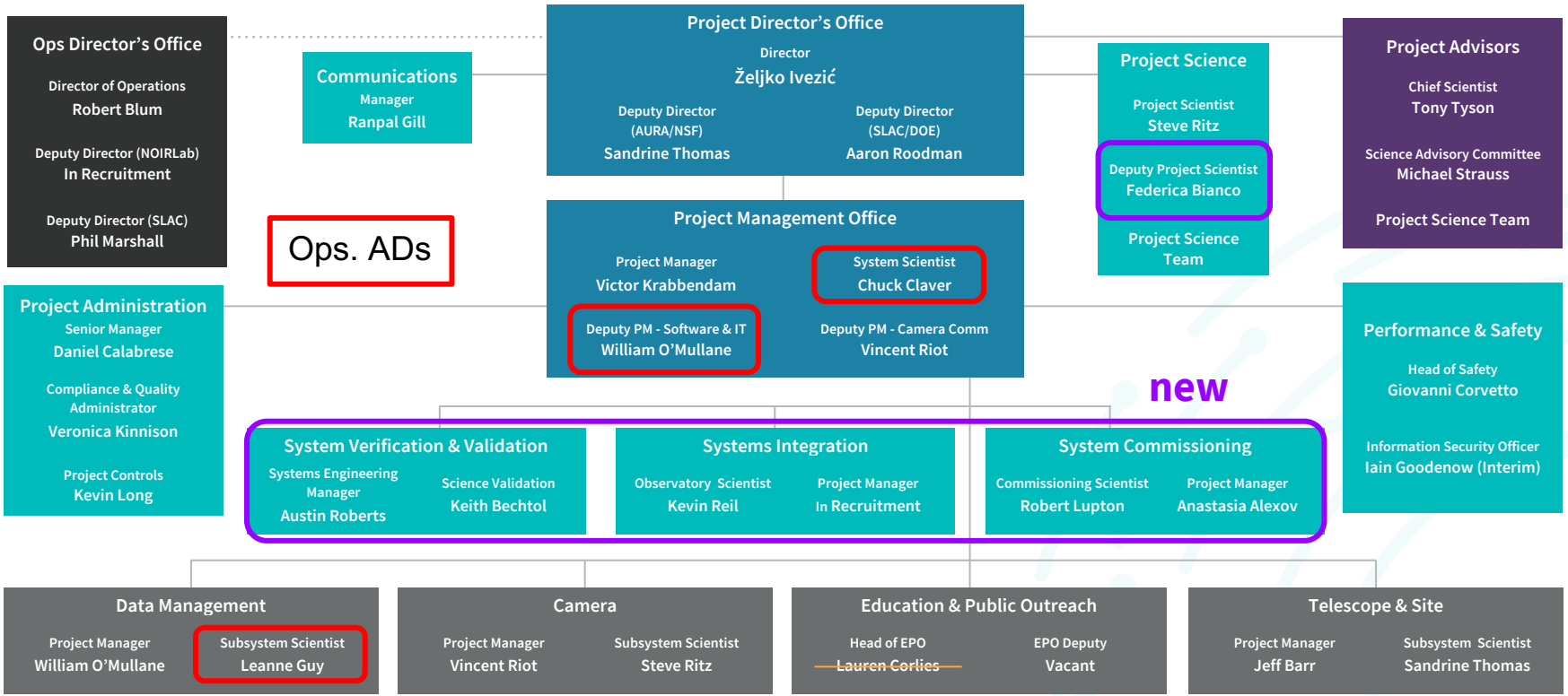
Aaron Roodman
LSST Camera Program Lead and Deputy Director for Rubin Construction for SLAC/DOE

Steve Ritz
Project Scientist for Rubin Construction

Updated Rubin Construction Org Chart

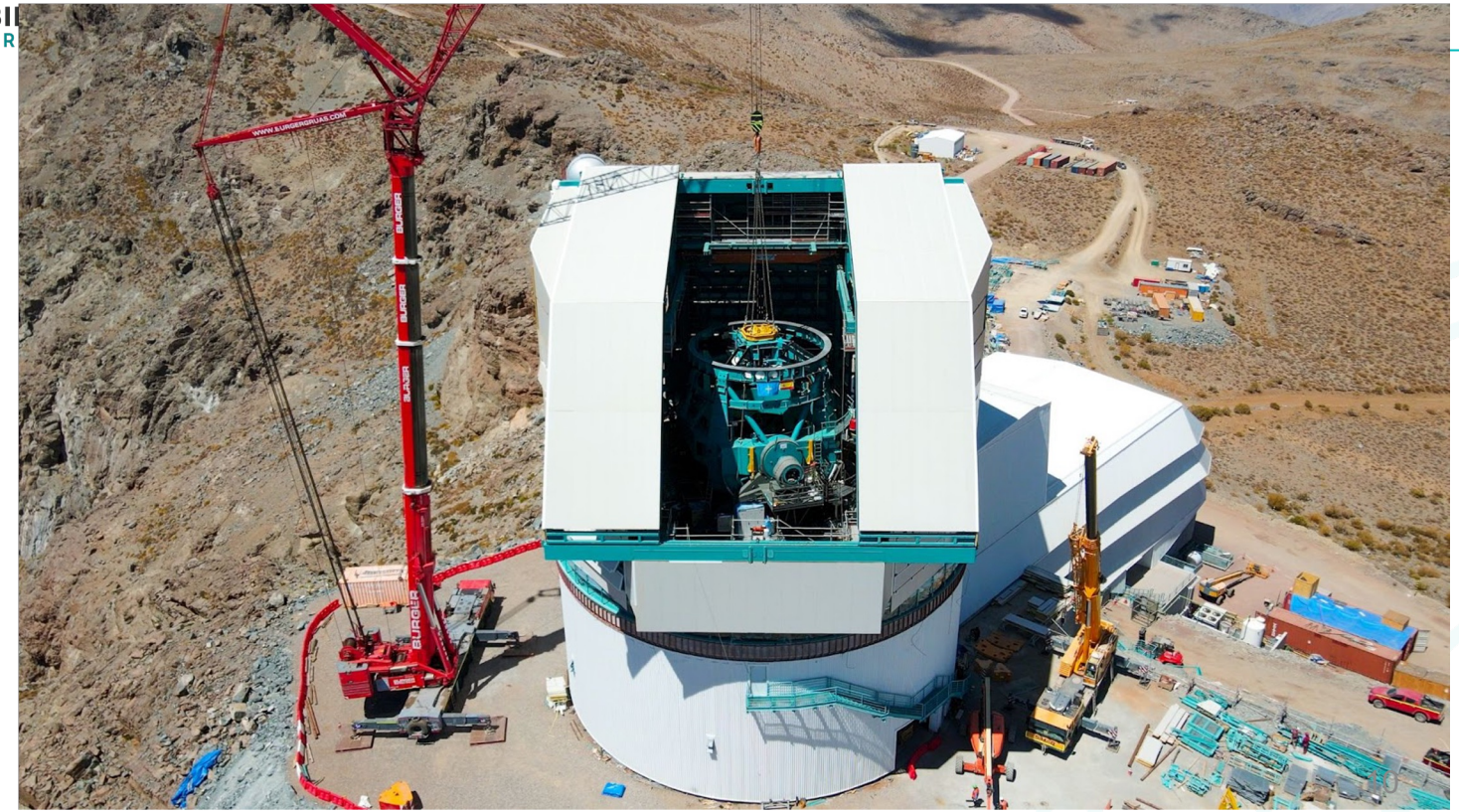
Updated 9/2022

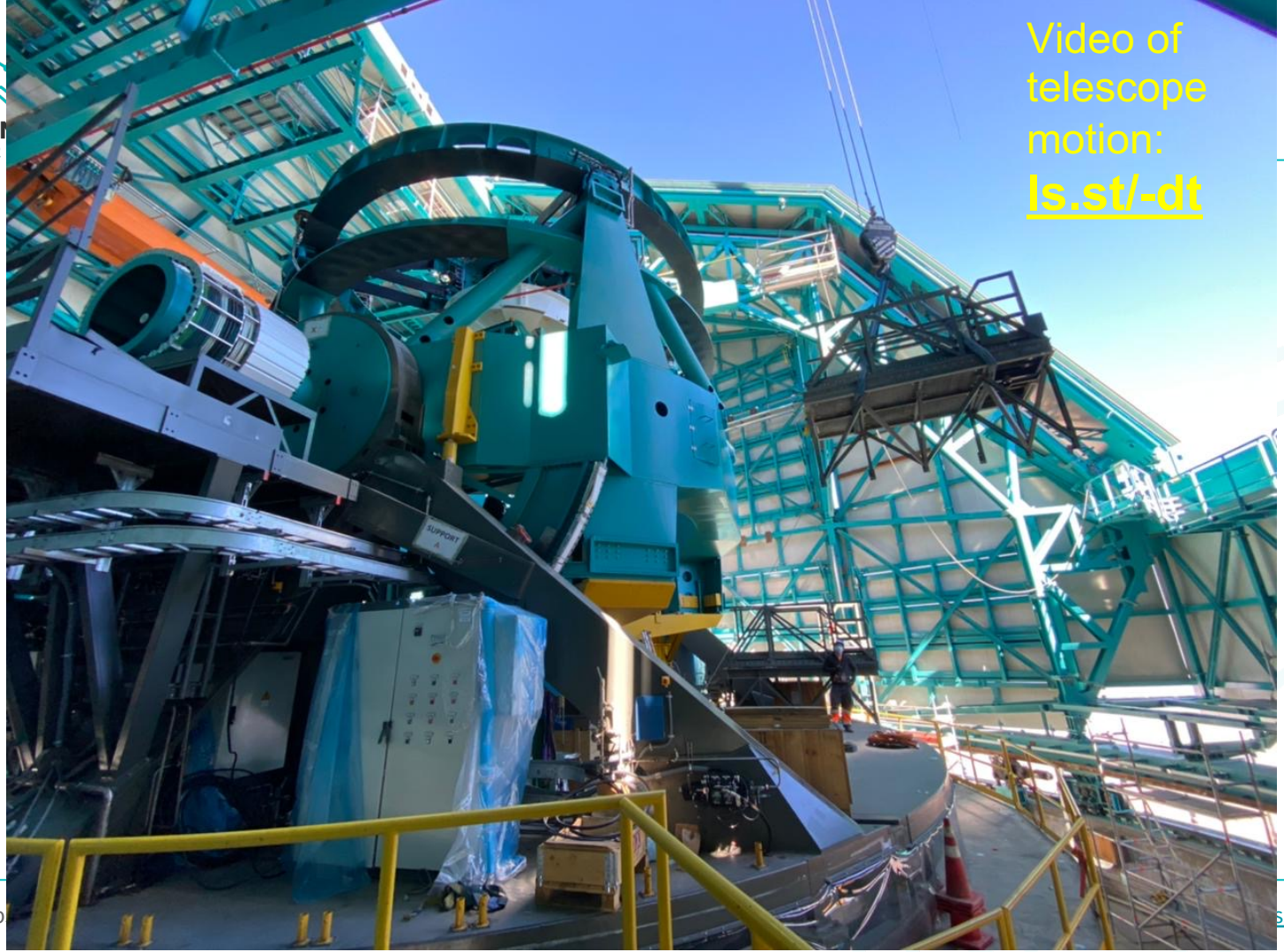
Project Office
Advisory
Project Support
Sub-systems
Rubin Operations

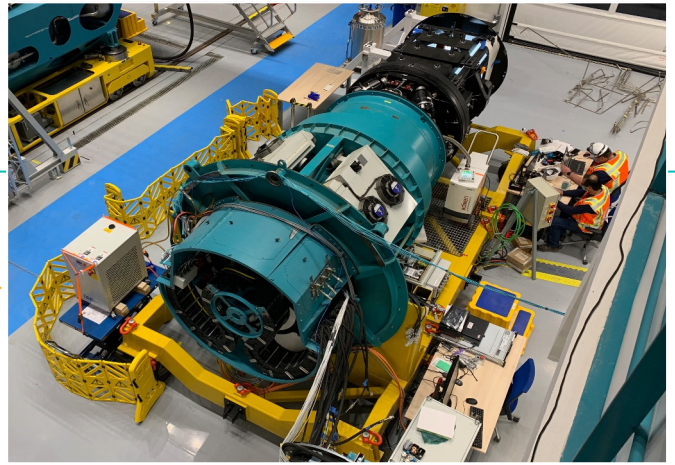


Construction progress

Steady progress at the summit

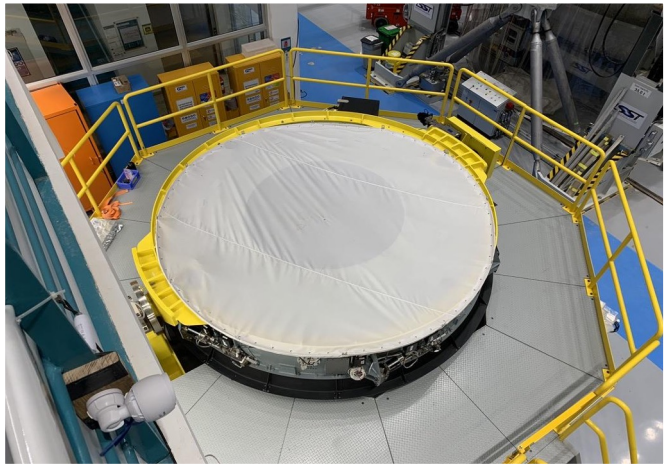



Video of telescope motion:
ls.st/-dt



Commissioning camera

Mirror washing station

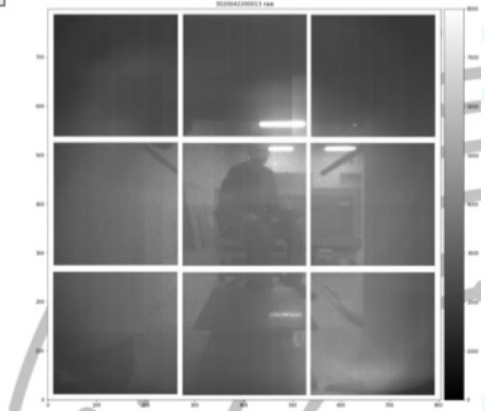


M2

Coating chamber

ComCam is operating at the Summit Facility

ComCam fully integrated at the summit.

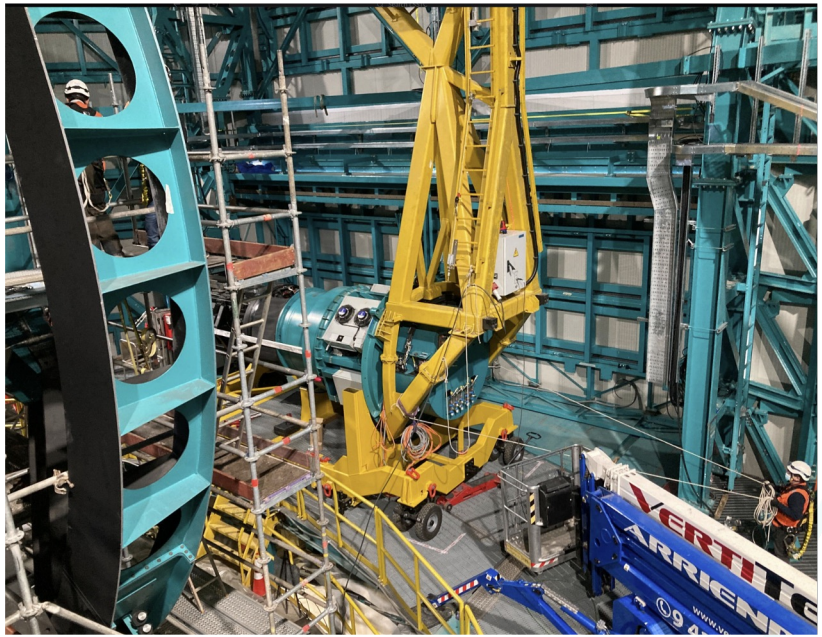


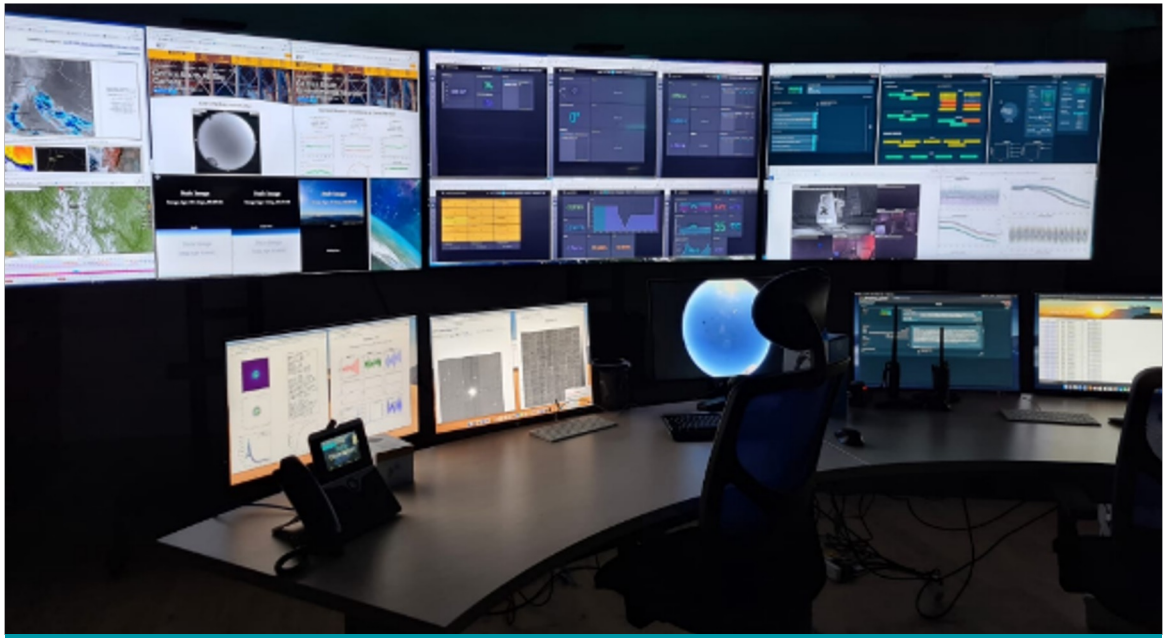
“First light” w/ComCam in the La Serena data center

Integration Example: TMA-Camera Interface

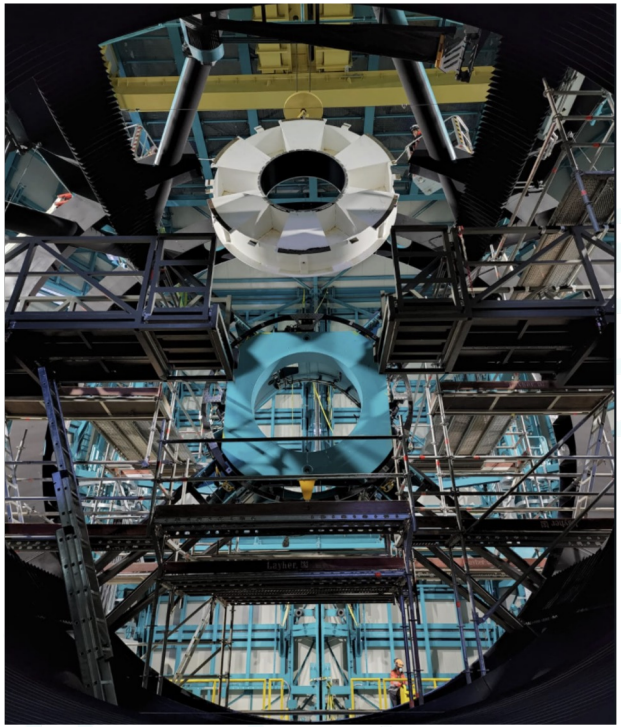
ComCam was used to test and verify the installation procedure that will be used for both ComCam and the LSST Cam.

August 24, 2022





Summit Control Room with LOVE (LSST Observing Visualization Environment) displays during an AuxTel run



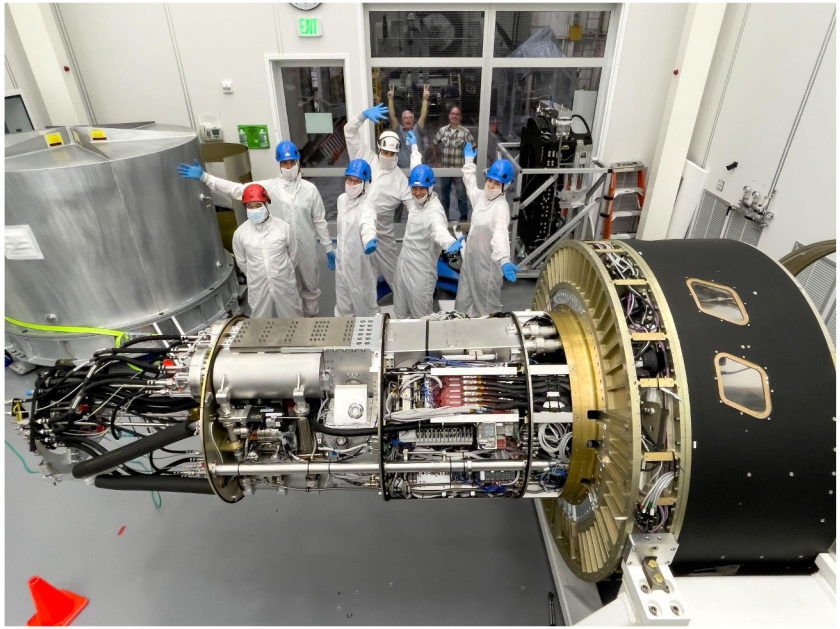
M2 surrogate installation

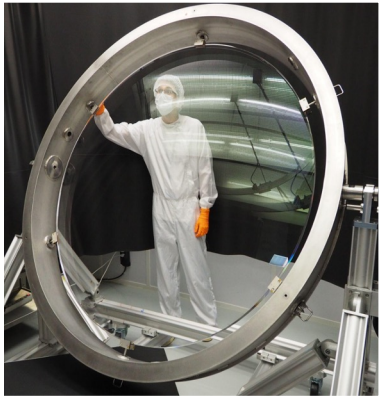
Commissioning progress

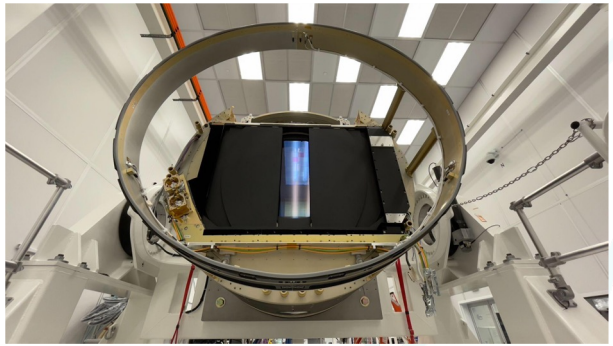
- AuxTel observing every two weeks
  - Observing is carried out using the scheduler and script queue
    - Spectroscopy
      - Reduction code is now fully in Rubin environment
    - A 1-degree^2 imaging survey
      - Processed to coadd-catalogues using Rubin pipelines
  - Using T&S/DM Active Optics System (AOS) code to analyze optical state of system

- Afternoon calibrations (ComCam and auxTel)
  - Taken using script queue
  - Automatically reduced to generate bias/flat/dark/gain/defect calibration products
    - Quality automatically assessed

LSSTcamera is still at SLAC... but almost ready to ship (May 2023)

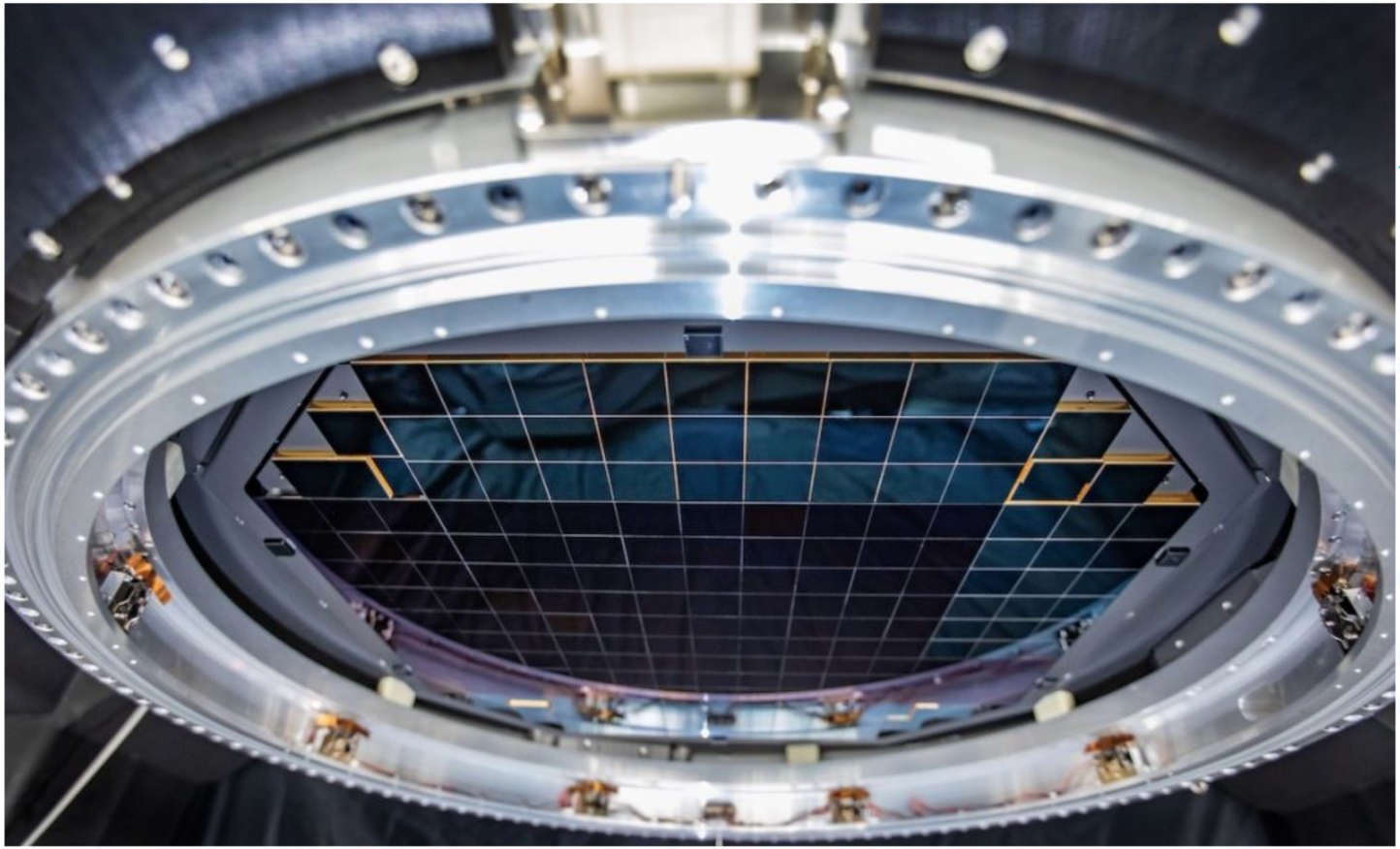






Camera Integration is nearly complete

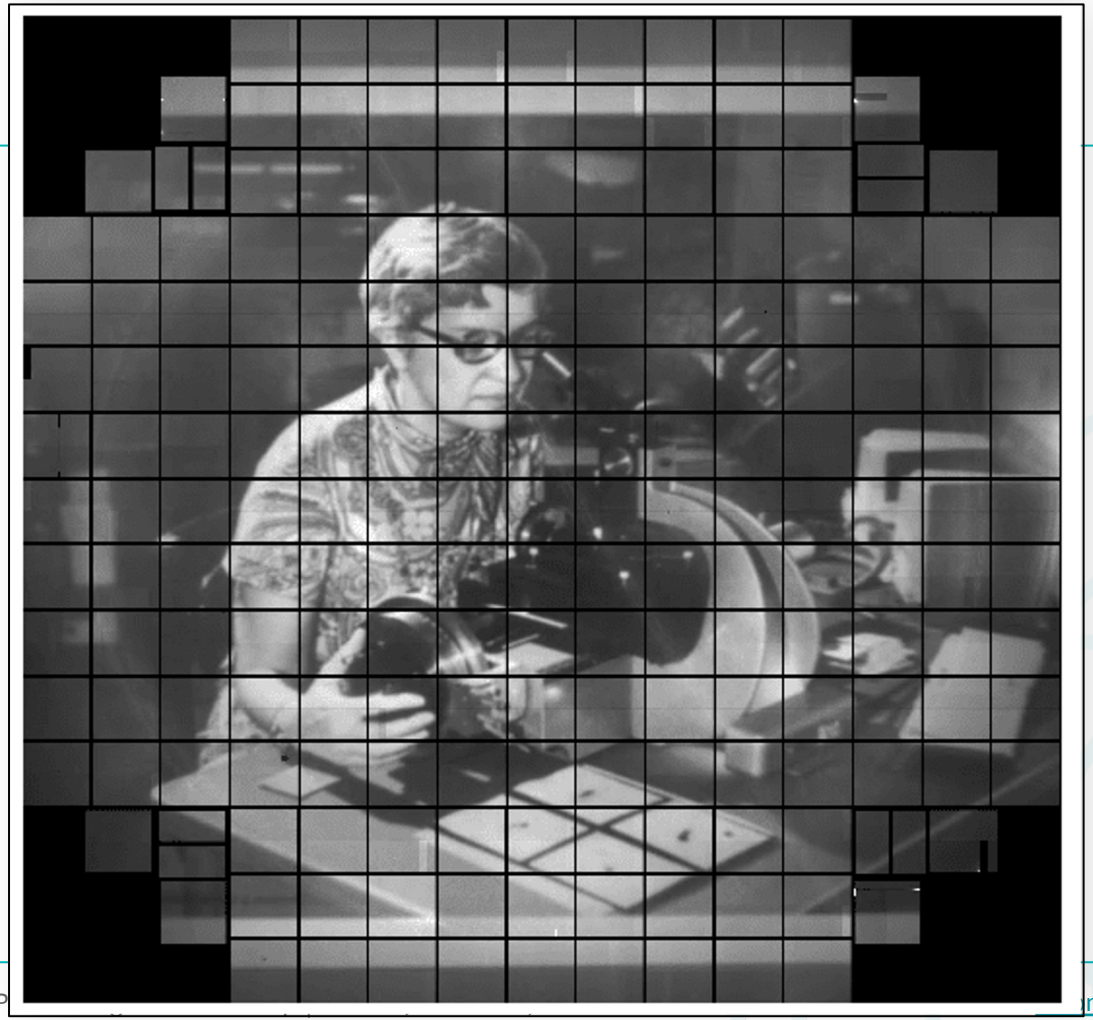
Camera assembly was completed in Sep'22: this is the first time camera subsystems are all together!



The complete focal plane of the future LSST Camera is more than 2 feet wide and contains 189 individual sensors that will produce 3,200-megapixel images.

It works!

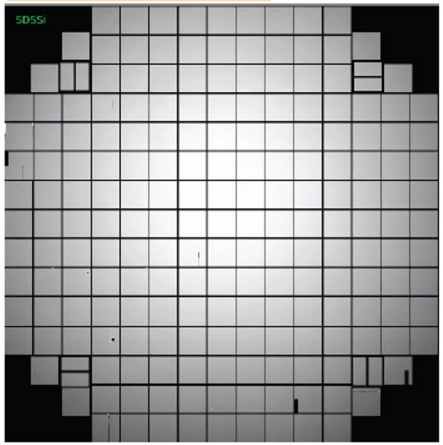
(well, 3 amplifiers, out of 3024, don't...)



Electro-optical testing has made great progress

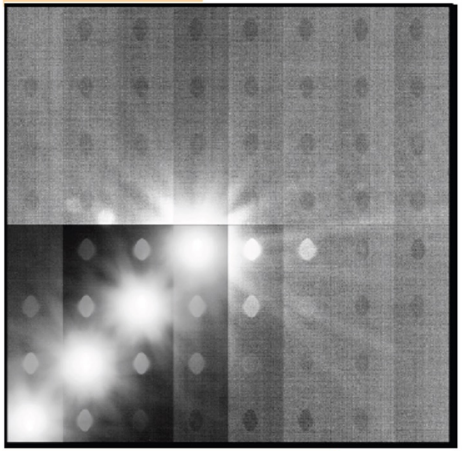
- Comprehensive set of images run was collected with standard Calibration Images: Bias, Dark, Flats plus structured images with several moveable projectors

Flat Illuminator



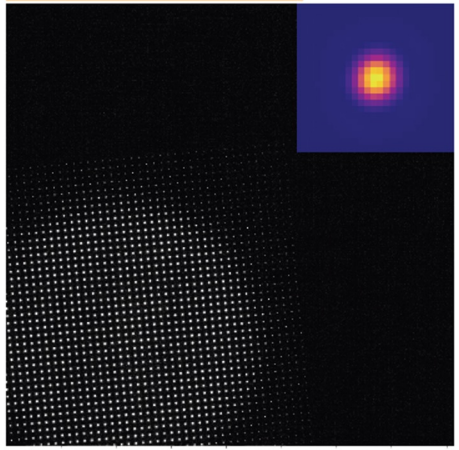
A. Rasmussen

XTalk Spots

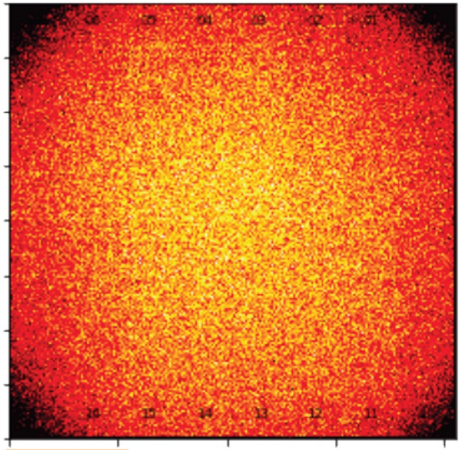


Focal Plane Viewer: T. Johnson

Focused Spot Grid



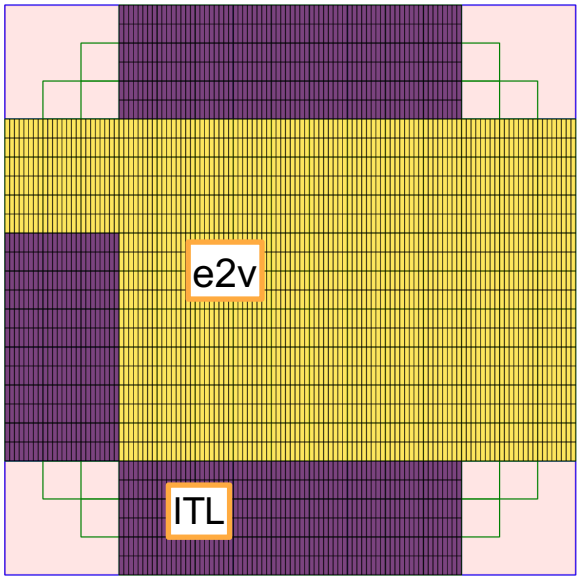
CCOB-wide



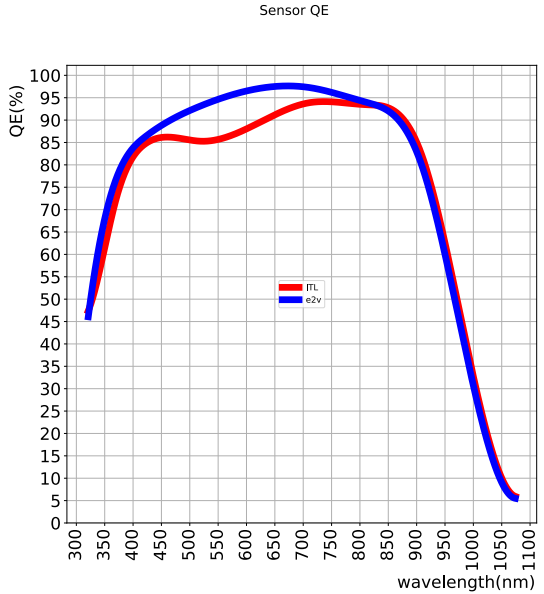
C. Combet

Camera EOT progress

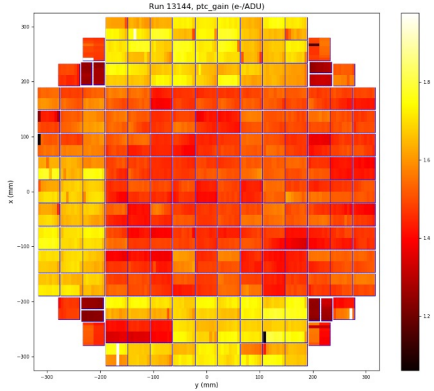
Rubin camera has two types of CCDs



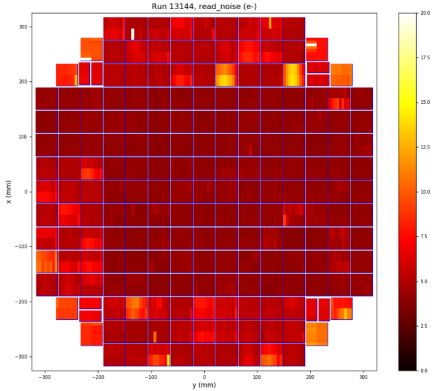
Average of a sample of sensors from each vendor



LSSTCam has had its first (of several) incremental verification & acceptance reviews



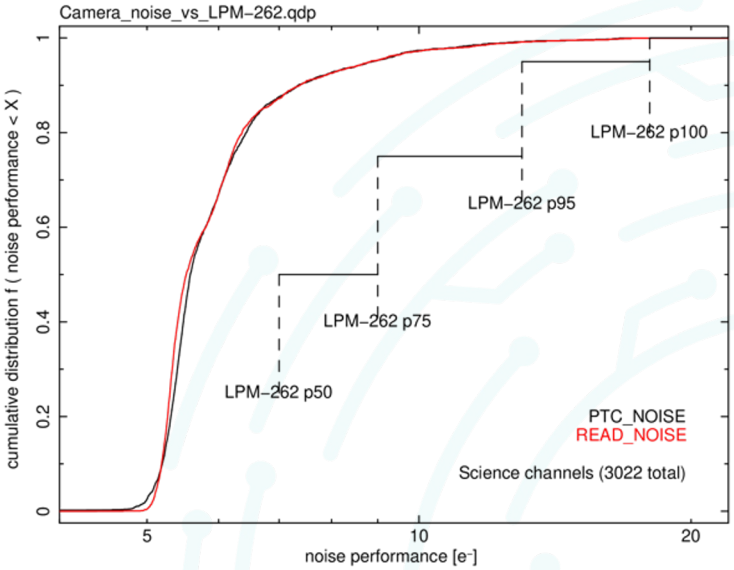
Gain map
(scale: 1.05-1.95 e-/ADU)



Read noise map
(scale: 0-20 e-)

June 1, 2022 review was focused on electro-optical FPA performance

LSSTCam FPA read noise cumulative distribution with allowed limits:



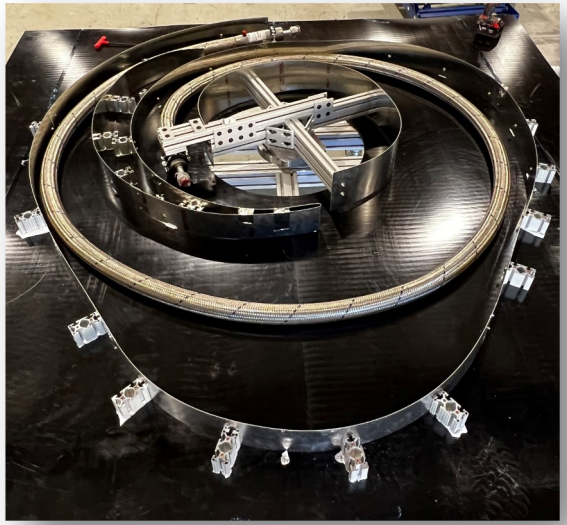
A recent challenge: the camera cold refrigeration system

We decided to switch priorities and focus resources on the alternate pumped coolant system because its probability of success is higher than for the compressed vapor system (with some impact on schedule and budget).

Original compressed vapor system: “refrigerator inside the camera”, coolant circulating around the observatory at approximately room temperature.

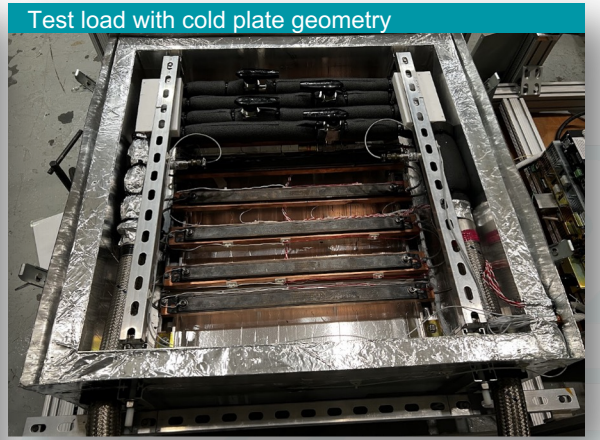
Alternate pumped coolant system: a stand-alone refrigerator (chiller) in another room; coolant circulating around the observatory at -50 C, resulting in new hazards that our teams has already addressed.

Pumped coolant replacement system is now mature



Prototype of the Pancake wrap

Chiller at SLAC with HFE-7100



Test load with cold plate geometry

- Final Design completed in 2022
- Prototype is far along and has mitigated most technical risks to low levels
- Passed Final Design Review in August 2022

LSST data products are organized into three main categories:

The LSST data products are organized into three main categories.

Prompt Data Products

Real Time Difference Image Analysis (DIA)

- A stream of ~10 million time-domain events per night (Alerts), transmitted to event distribution networks within 60s of camera readout.
- Images, Object and Source catalogs derived from DIA, and an orbit catalog for ~6 million Solar System bodies within 24h.
- Enables discovery and rapid follow-up of time domain events

Data Release Data Products

Reduced single-epoch & deep co-added images, catalogs, reprocessed DIA products

- Catalogs of ~37 billion objects (20 billion galaxies, 17 billion stars), ~7 trillion sources and ~30 trillion forced source measurements.
- 11 Data Releases, produced ~annually over 10 years of operation
- Accessible via the LSST Science Platform & LSST Data Access Centers.

User Generated Data Products

User-produced derived, added-value data products

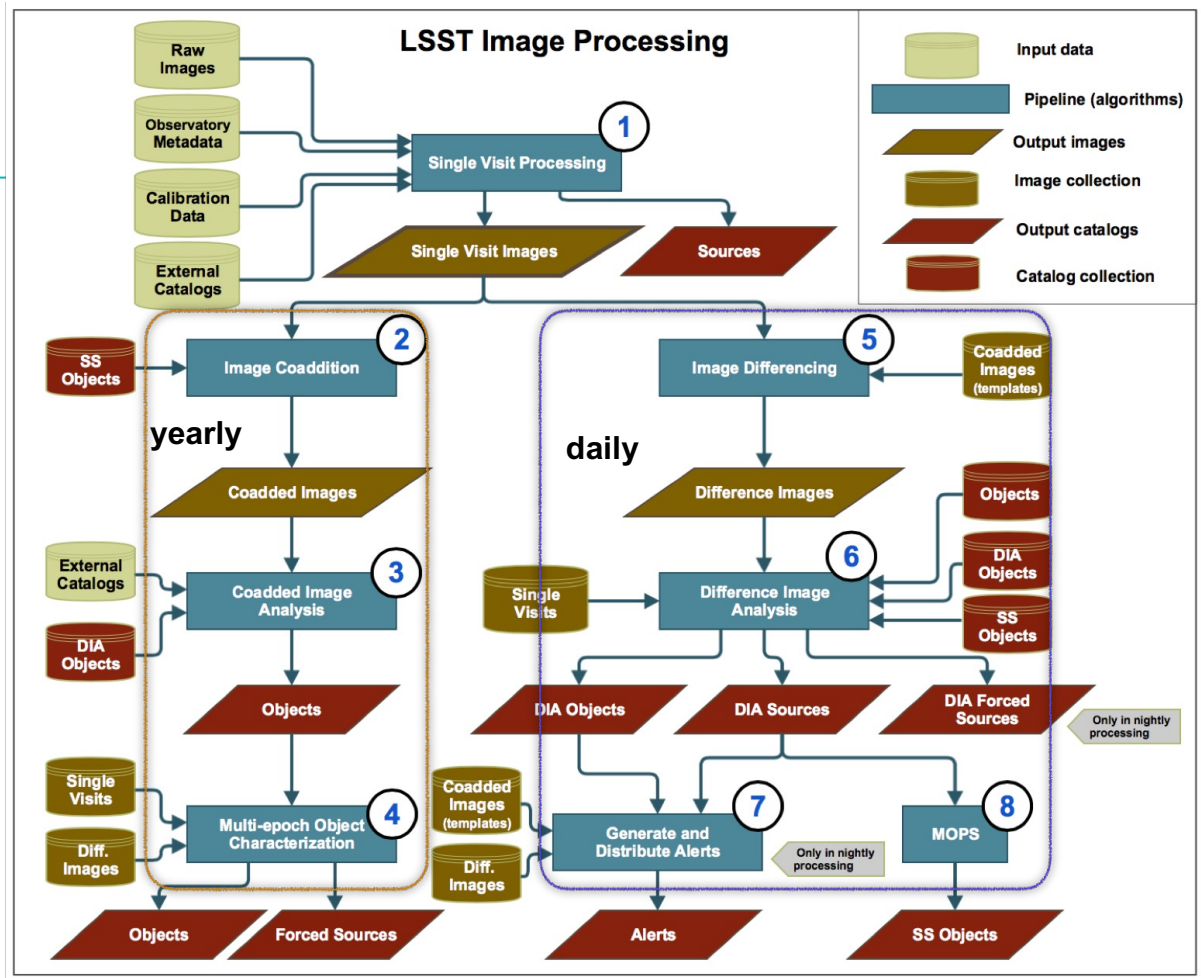
- Deep KBO/NEO, variable star classifications, shear maps, etc …
- Enabled by services & computing resources at the LSST DACs and via the LSST Science Platform (LSP).
- 10% of LSST computing resources will be allocated for User Generated data product storage & processing.

You will get LSST data via the Rubin Science Platform

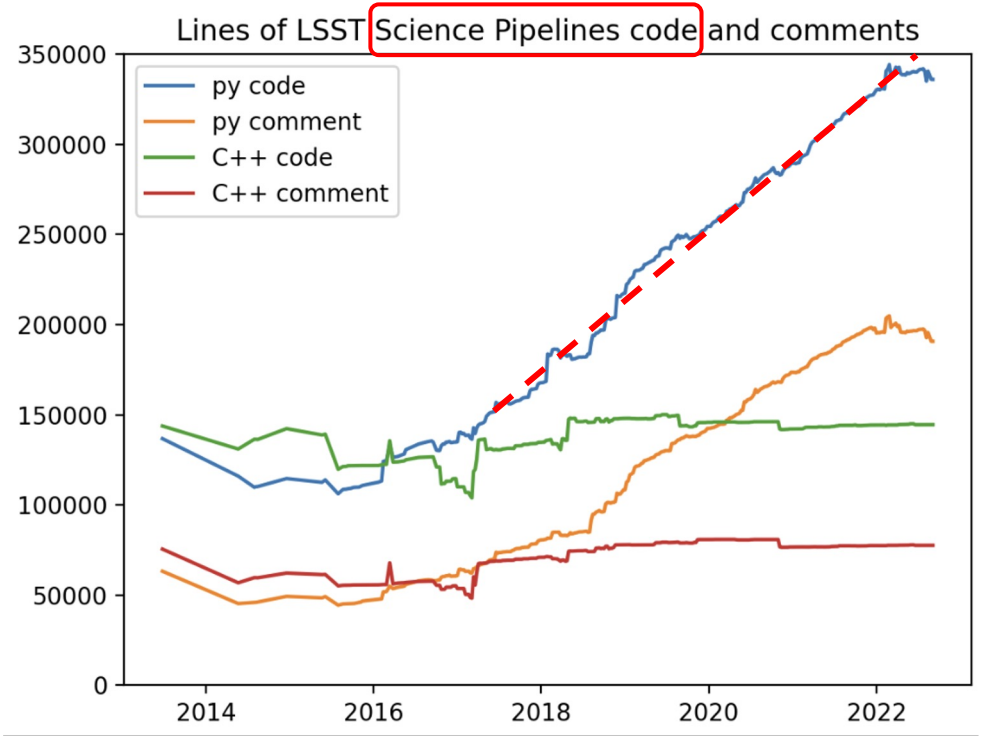
LSST Data Product Categories & DM Data Products & LSST Key Numbers

LSST Data Products: see http://ls.st/dpdd

For more details about LSST data processing algorithms, see ls.st/ldm-151



Data Management Progress

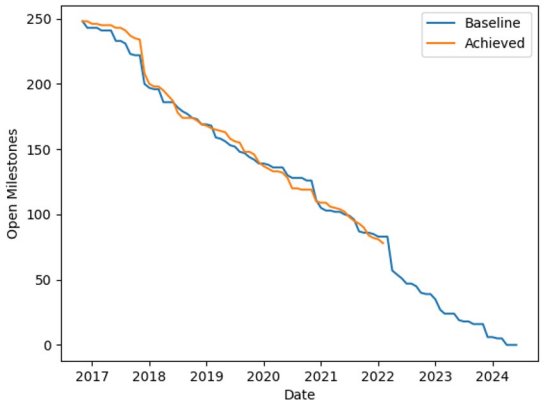


Analysis by Tim Jenness

Where is COVID?

Unstoppable DM!

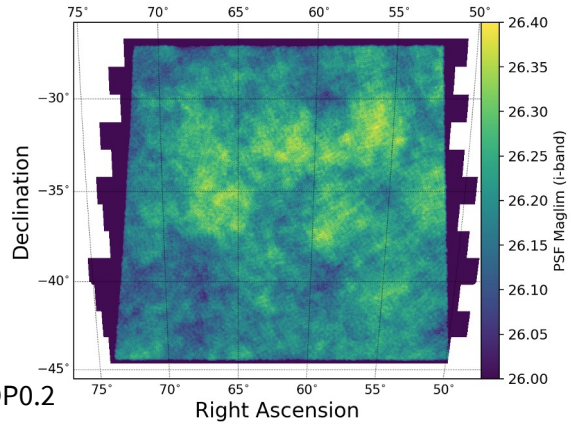
Note: about half a million lines of code.



DM milestone completion trend analysis encouraging!

Some Recent DM Achievements

- Major progress with algorithms implemented in Science Pipelines (point spread function estimation, background, galaxy photometry, image differencing…)
- Some DM pipelines already used by ZTF and Subaru HSC surveys in production
- DP0.2 simulated data processed with Rubin Pipelines v23 (and catalogs loaded into Qserv database framework)
- AuxTel is online with monthly observing runs (including Imaging Survey data reduction)
- USDF ramping up and multi-site processing development advancing well (NCSA switched off Aug 15, 2022)
- 7 community alert brokers successfully connected to a production-ready alert streaming service using simulated data
- Automatic generation of QA plots during DR processing
- Tight collaboration between Construction and Ops



Visualization from DP0.2

US Data Facility: at SLAC and Hybrid

- See DMTN-189 USDF Specification
- All prompt processing, 25% of data release processing, and data access services to the US and international community.
- S3DF at SLAC for processing/storage
- Cloud-based Interim Data Facility used for pre-ops activities will be used for front end RSP in OPS (O'Mullane 2022).

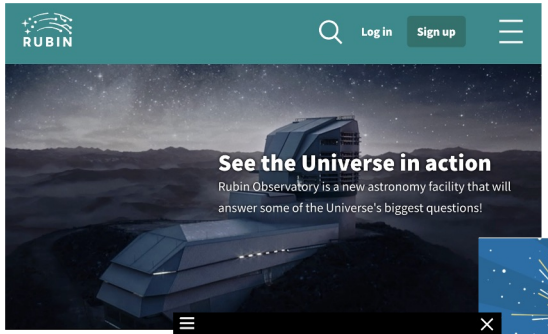
Photo: wil. S3DF = SLAC Shared Scientific Data Facility

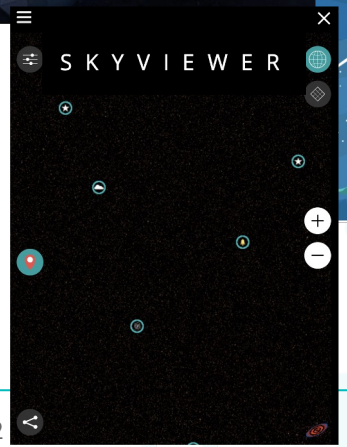
Education & Public Outreach

These deliverables correspond to the EPO Completion Criteria defined in SITCOMTN-005

EPO has delivered a unique, ambitious program to promote Rubin Observatory

- New public facing website
- Formal Education Program
- Animated video series
- Gallery of multimedia assets
- Planetarium video assets
- Interactive game
- Interactive data visualizations
- Staff profile series
- Citizen science pipeline infrastructure

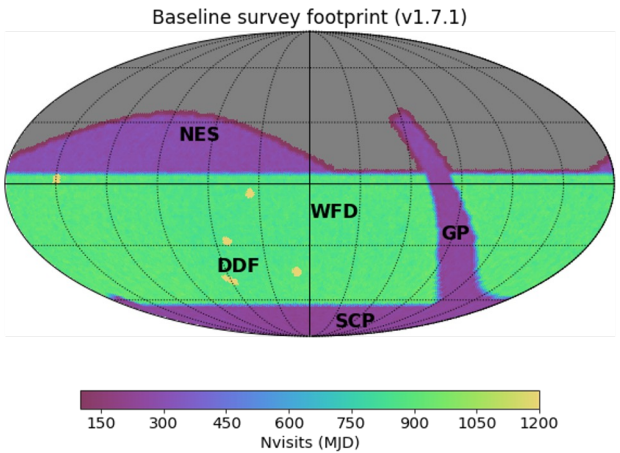


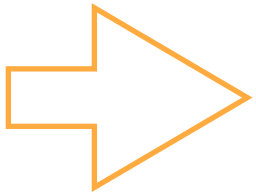


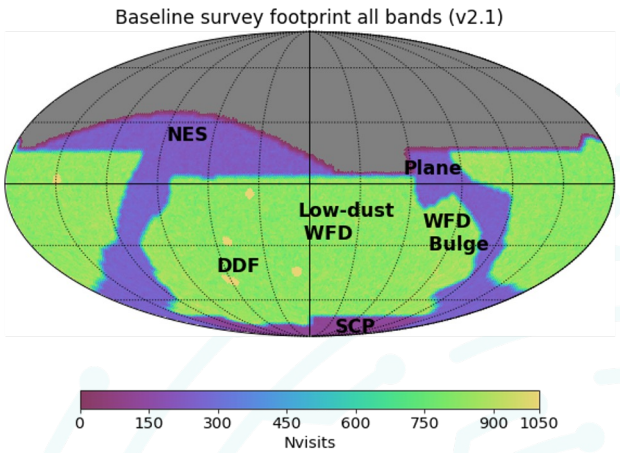
Currently developing plans for EPO Final Acceptance Review this Fall

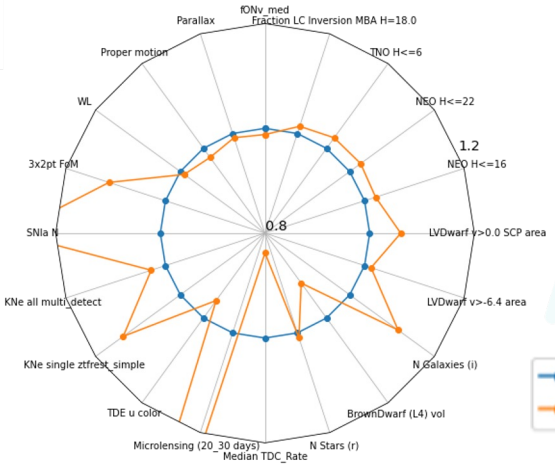
Survey Strategy Optimization

Implementing the 12/2021 recommendations led to significant improvement for most science cases









Led by the Deputy Project Scientist Federica Bianco (and the SCOC Chair)

SDSS gri
3.5’x3.5’
r~22.5

3 arcmin is 1/10 of the full Moon’s diameter

or 1/70 of the LSSTCam’s FOV

HSC gri
3.5'x3.5'
r ~ 27

like LSST depth
(but tiny area)

LSST will deliver
5 million such
images!

Remaining Tall Poles and Schedule

- **Camera Refrigeration System**
- Completion of TMA and Dome contracts
- Persistence of delays due to Covid
- **Construction in the end-game phase (integration and commissioning)**
- Continuity of personnel and technical expertise (and smooth transition to Ops)

  - **ComCam: Engineering First Light: July 2023**
  - **LSSTCam: System First Light: March 2024**
  - **Start of Operations and LSST: Fall 2024**

For monthly updates, see ls.st/dates

Still months of uncertainty in first light dates, but we will get there

An example of a recent (Aug 2022) non-Gaussian event that led to a 1-month schedule delay

An aerial view shows Vera C. Rubin Observatory and the surrounding area covered in snow following the second major snowstorm to hit the site in July 2022. The photo was taken from a helicopter evacuating service personnel from Cerro Pachón. Days before the storms, vendors completed a seal that blocks wind, precipitation and dust from entering the dome interior.

Evidence of the impacts from the second major snowstorm to hit the Vera C. Rubin Observatory site in July 22 shows the on-site weather tower downed by wind (left) and a snowbank blocking the summit facility entrance below the dome.

Executive Construction Status Summary

- **Project continues to make good progress: we are deeply engaged in the critical assembly, integration, and test phases of the program.**

- **But there are remaining challenges, too:**
  - Camera Refrigeration System
  - Completion of TMA and Dome contracts
  - Persistence of delays due to Covid
  - Construction in the end-game phase (integration and commissioning)
  - Continuity of personnel and technical expertise (and smooth transition to ops)

Still months of uncertainty in first light dates, but we, Rubin and LSST will get there!