Here comes Vera C. Rubin Observatory!
Current status and some resources for getting ready

Peter Ferguson
with
Jeff Carlin and Alex Drlica Wagner
DGSCS 2024
So far in 2024….

Dynamic testing of the TMA (Telescope Mount Assembly)
https://rubin.canto.com/v/gallery/smartalbum/video?viewIndex=2&referenceTo=&from=curatedView&display=fitView&column=video&id=8e198klb5h0bp0nhkuef3vs27j
So far in 2024....

Coating the primary mirror
M1M3
So far in 2024….

LSST Cam leaves SLAC and arrives at the Observatory!
System Integration and Commissioning

Completed:
- Dynamic testing of the TMA (Telescope Mount Assembly)
- Coating and installation of the M1M3
- LSST Camera in Chile

Soon:
- M2 installation
- ComCam on sky late summer (we are an observatory)!

Early 2025:
- System First light with LSST Cam

Late 2025:
- Survey Begins
Operations Timeline: Data releases

<table>
<thead>
<tr>
<th>Event</th>
<th>Date Range</th>
<th>FY 2025</th>
<th>FY 2026</th>
<th>FY 2027</th>
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<tr>
<td><strong>Start of Survey</strong></td>
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<td>RFL (Rubin First Light)</td>
<td>Mar 2025 - Apr 2025</td>
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<td>DP1 (ComCam/LSSTCam Data)</td>
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<td>OPS (Start of Operations)</td>
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<td>SVY (Start of Survey)</td>
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<td>DP2 (LSSTCam Science Validation Data)</td>
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<td>DR1 (LSST First 6 Months Data)</td>
<td>Jun 2026 - Jan 2027</td>
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<td>DR2 (LSST Year 1 Data)</td>
<td>Jun 2027 - Jan 2028</td>
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<td>DR3 (LSST Year 2 Data)</td>
<td>Jun 2028 - Nov 2028</td>
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- **January 01, 2025**
- First exposure to real Rubin data
- First science dataset
- First annual data release ~ 1 yr after start
### Table 1: Summary of data products expected in each data preview and early survey data release.

<table>
<thead>
<tr>
<th>Data Product</th>
<th>DP0.1</th>
<th>DP0.2</th>
<th>DP0.3</th>
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<th>DP2</th>
<th>DR1</th>
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Simulated LSST-like images and catalogs generated by the LSST Dark Energy Science Collaboration (DESC) for their Data Challenge 2 (DC2; arXiv:2101.04855).

**Simulated images** over 300 deg$^2$ for 5 years of an early baseline survey strategy in the wide-fast-deep (WFD) region (no deep drilling fields; non-rolling cadence).

**Simulated astrophysical objects** in the WFD images include galaxies (with large-scale structure), Type Ia supernovae, and stars (10% are one of 3 types of variables).

**Imaging data products** include:
- processed visit images (PVIs), deep coadds, and difference images

**Catalog data products** include:
- SNR>5 detections and forced photometry in all image types
Early Data Products

- **DP1: LSSTCam/ComCam data**
  - As is data taken, likely a few individual fields at different stellar densities
  - Raw images and visit level catalogs

- **DP2: Science Validation data**
  - First science dataset
  - No promises
  - Possibly a field (~10 sq deg) to 20 year depths and 1000 sq deg to year 1 depths (~30 visits per band)

- **DR1: First 6 months of data**
Early Data Products

● **DP1: LSSTCam/ComCam data**
  ○ As is data taken, likely a few individual fields at different stellar densities
  ○ Raw images and visit level catalogs

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  ○ First science dataset
  ○ No promises
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● **DR1: First 6 months of data**

rubin_sim
Early Data Products

● Expected single-image depths (point source; AB)
  ○ $ugrizy = 23.9, 25.0, 24.7, 24.0, 23.3, 22.1$ mag

● Year 1 (Dr2) ~ 30 visits per band over footprint ~1.8 mag deeper

● LSST year 10:
  ○ $ugrizy = 26.1, 27.4, 27.5, 26.8, 26.1, 24.9$ mag
It will not be possible to download the entire LSST data set, and scientists will need a venue for "next-to-the-data analysis".

The **Rubin Science Platform (RSP)** is a set of integrated web-based applications and services running at the Rubin Observatory Data Access Centers (DACs).

The RSP will include tools to query, visualize, subset, and analyze the full LSST data archives in a stable software environment located “next-to-the-data”, along with storage space, compute resources, and remote access options.
Resources

DP0 Documentation & Resources
Rubin Community Forum
Rubin Science Platform
up-to-date project schedule, milestones
webpage for scientists
project website
Rubin Community Workshop 2024

dp0.lsst.io
community.lsst.org
data.lsst.cloud
https://dmtn-232.lsst.io/
lsst.org/scientists
rubinobservatory.org
project.lsst.org/meetings/rubin-2024/
What should we (You!) help with?

- Star galaxy separation beyond default morphological selection
- Advanced lsb detection and measurement
- LSB background subtraction
- Transient objects and variable stars
- Crowded field photometry
- Astrometry

Find out how to join at: https://lsstdiscoveryalliance.org/lsst-science-collaborations/
Thanks for listening!