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LSST Operations LSST UK, May 2019

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LSST is an Observatory System







Primary Science Drivers



Cosmology 5% albedo 20% albedo — WL 10³ 50% albedo - BAO Dark energy -... Cluster (Ex) 10⁴ 0.5 --- SN r=27 5 Dark matter r=24.7 WL+BAO A11 Ŵ Milky Way Na. Object **Stellar populations** PHA goa -0.5Stellar Streams, Dwarf Galaxies Curvature floating 10 Systematics and Classical Nova Solar System Planck priors included 10-10-1 10° 10¹ 10² Detection Distance at Opposition (AU) Characteristic Timescale [dav] **Near-Earth Objects** -1.2 -0.8-1.4-0.6-1 W_o **Trans-Neptunian Objects** Main-Sequence Turnoff Red Giant Branch RR Lyrae Comets LSST ★ * **Dynamic Universe** * LSST LSST **Explosive transients** Volume (kpc³) (kpc³) dilky Way Virial Rad Volume (kpc³) Multi-messenger counterparts Volume (Variable stars, quasars 1010 DES DES Lensing events Pan-STARRS 1 . SDSS SDSS

200 250 300 350

Distance (kpc)

1000 2000 3000 4000 5000 6000 7000

Distance (kpc)

0

100 200 300

0

400 500

Distance (kpc)

600 700

50 100 150

10

AURA LSST's survey: a 10-year log of half the sky



LSST will image the entire Southern sky (18k sq deg) every few nights, taking an image every ~40 seconds, for 10 years.

The result: *an 825-frame movie in 6-filter technicolor of every object present*







Prompt

Releases

)ata

- A stream of ~10 million time-domain events per night, detected and transmitted to event distribution networks within 60 seconds of observation.
- A catalog of orbits for ~6 million bodies in the Solar System.
- A catalog of ~37 billion objects (20B galaxies, 17B stars), ~7 trillion observations ("sources"), and ~30 trillion measurements ("forced sources"), produced annually, accessible through online databases.
- Deep co-added images.

The production of data products will be transparent: All software is developed open-source and will be available to the community.







Staffing for Operations, Baseline 2017

AURA









- The LSST Commissioning Team will generate data products from the observations taken in commissioning. The Commissioning team will verify, validate, and characterize these products, in order to test for the operations readiness of the system.
- The LSST Operations team plans to use the commissioning data products to develop and test its procedures for releasing, and then supporting the use of, LSST data.
- Preparing for each data release "scenario" in commissioning and science validation will take time and effort by the ops team.





- Two 6-week continuous scheduler-driven surveys exercising the prompt and data release processing science pipelines
- Comprehensive characterization of bulk data acquired under nominal observing conditions
- Identifying corner cases with the aid of a larger statistical sample





Commissioning Data Sources



Milestone	Date
Start of On-Sky Data from Auxiliary Telescope	Oct. 2019
Start of On-Sky & Calibration Data with ComCam	Oct. 2020
Sustained Observing with ComCam	Feb. 2021
Start of On-Sky & Calibration Data with LSSTCam	July 2021
Sustained Observing with LSSTCam	Oct. 2021
Start of Science Verification mini-Surveys	Dec. 2021
Operations Readiness Review	March 2022





- Scenario is a possible data release schedule or timeline
- Current plans include 3 scenarios for pre-operations (ComCam, LSSTCam, SV mini-Surveys)
- Release may start at flat files, will evolve to fully supported Data Access Center with LSP (LDM-554)
- Plan to release data through LSP ASAP to gain operational experience and user feedback
- Scenario 1, first image data released with 6 months following ComCam data complete. Catalogs 3 months later
- Scenario 2, 3 full data preview released 6 months after data taking complete. (See S16)





- ComCam Q2 2022
 - Data taking ends June 2021
 - Start releasing data (images) Dec 2021
 - Full data release Mar 2022
- LSSTCam Q3 2022
 - Data taking ends Dec 2021
 - Full data release June 2022
- SV mini-Surveys Q4 2022
 - 1-3 surveys
 - Data taking ends Mar 2022
 - Deliver first MS six months after finished (Sep 2022)

End of presentation