Mapping the Solar System

TELESCOPE

Large Synoptic Survey Telescope (LSST) – an integrated system designed to conduct an unprecedented decade-long survey of the optical sky -- features an 8-meter wide-field telescope, a 3.2 Gpix camera, and an automated data processing system. LSST science focuses four main areas: understanding the nature of Dark Matter and Dark Energy, mapping the structure of the Milky Way structure, exploring the variable and transient sky, and cataloging and characterizing the Solar System.

LSST will make uniquely powerful contributions to the study of small bodies throughout the Solar System by discovering and monitoring millions of Solar System bodies.

DATA

LSST will capture an area the size of 40 full moons with each pair of 15-second exposures, and return to the same area of sky roughly every three nights. Over ten years of operations, each part of the sky will be sampled with hundreds of deep exposures. Dedicated computer facilities will process LSST data in real time, issuing worldwide alerts within 60 seconds of detected changes in the sky. Scientists can "observe" the sky by mining the data, carrying out multiple independent research programs simultaneously.

SOLAR SYSTEM

LSST will make uniquely powerful contributions to the study of small bodies throughout the Solar System. LSST will increase the number of known objects by roughly an order of magnitude; many of these objects will receive hundreds of LSST observations at multiple wavelengths. LSST will thus provide rough size estimates and colors for nearly all of these bodies, providing evidence for the chemical distribution of the primordial disk and its collisional processes.

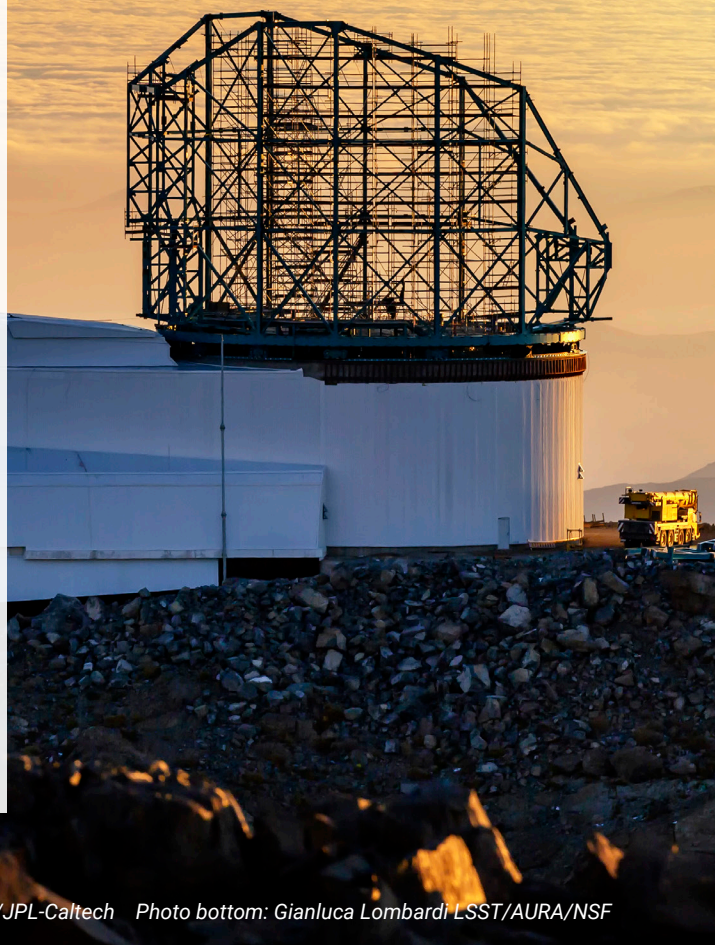

Illustration top: NASA/JPL-Caltech Photo bottom: Gianluca Lombardi LSST/AURA/NSF

NSF AURA U.S. DEPARTMENT OF ENERGY Office of Science SLAC NATIONAL ACCELERATOR LABORATORY CHARLES AND LISA SIMONYI FUND FOR ARTS AND SCIENCES LSST Large Synoptic Survey Telescope

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	Currently Known	LSST Discoveries	Median number of observations	Observational arc length
Near Earth Objects (NEOs)	~14,500	100,000	(D>250m) 60	6.0 years
Main Belt Asteroids (MBAs)	~650,000	5,500,000	(D>500m) 200	8.5 years
Jupiter Trojans	~6,000	280,000	(D>2km) 300	8.7 years
TransNeptunian + Scattered Disk Objects (TNOs + SDOS)	~2,000	40,000	(D>200km) 450	8.5 years
Interstellar Objects (ISOs)	1	10	?	?

Over its 10-year lifespan, LSST is expected to catalog over 5 million Main Belt asteroids, almost 300,000 Jupiter Trojans, over 100,000 Near Earth Objects (NEOs), over 40,000 TransNeptunian Objects (TNOs), tens of interstellar objects, and over 10,000 comets between approximately 16 and 24.5 magnitudes (in r band) (LSST Science Collaboration et al. 2009; Solontoi et al. 2010; Jones et al 2015; Cook et al. 2016; Engelhardt et al. 2017; Trilling et al. 2017). LSST will identify and characterize 10 to 100 times more objects than are currently known in the Solar System's small body reservoirs.

Effective Mirror Diameter	*6.7 m*
Field of view	*9.6 sq deg*
Survey length	*10 years*
Sky coverage	*~18,000 sq deg*
Site	*Cerro Pachon*
Filters	*ugrizy*
Typical seeing	*0.7"*
Exposure ('Visit') Time	*2x15 s /visit*
Data rate	*~15 TB/night*
Photometric accuracy	*10 mmag*
Astrometric accuracy	*50 mas*

See more at www.lsstsssc.org

Illustration top: NASA/JPL-Caltech

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