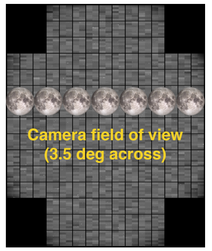
RUBIN OBSERVATORY LEGACY SURVEY OF SPACE AND TIME (LSST)

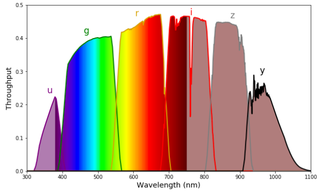
First Light — Survey Operations

2021 2023 2033

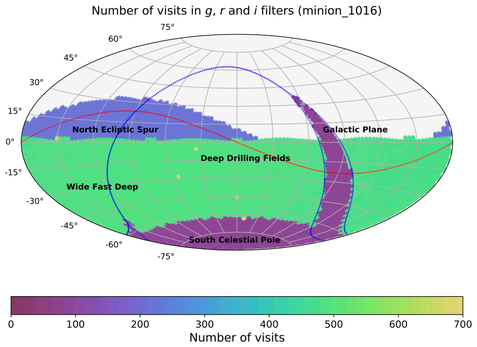
Effective Mirror Diameter	*6.7 m*
Field of view	*9.6 sq deg*
Survey length	*10 years*
Sky coverage	*~18,000 sq deg*
Site	*Cerro Pachon*
Filters	*ugrizy*
Typical seeing	*0.7”*
Exposure (‘Visit’) Time	*2x15 s /visit*
Readout Time	*2 s*
Typical slew/settle	*5 s*
Data rate	*~15 TB/night*
Photometric accuracy	*10 mmag*
Astrometric accuracy	*50 mas*
Astrometric precision	*10 mas*

	u	*g*	*r*	*i*	*z*	*y*
Typical # visits/field	*70*	*100*	*230*	*230*	*200*	*200*
m5 depth	*23.8*	*24.8*	*24.4*	*24.0*	*23.3*	*22.4*

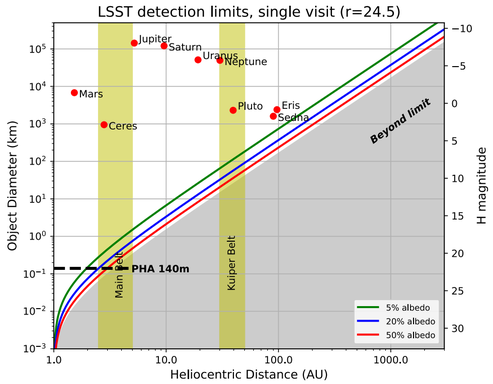




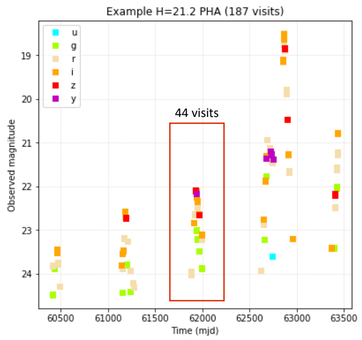
Throughput curves



Survey strategy details are evolving; generally, each field observed 2x / night, every 3 nights. Footprint and details of cadence under optimization.

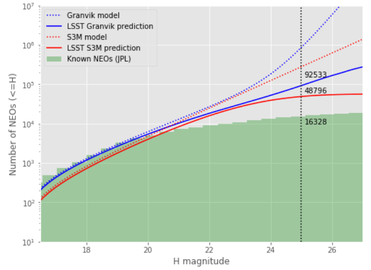


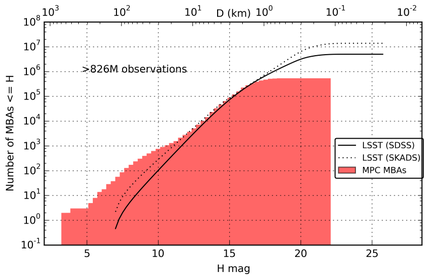
Sensitivity limits (single visit)



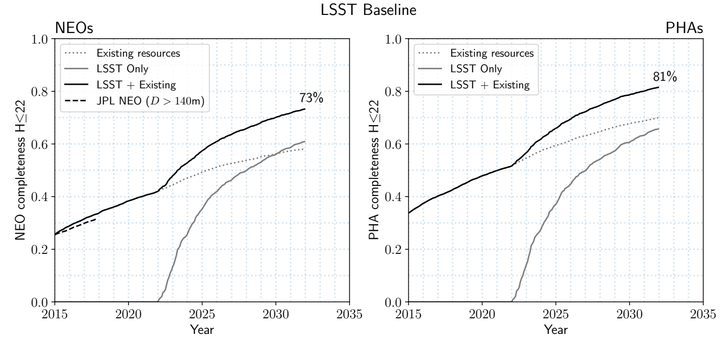
Simulated observations of a PHA with H=21.

	Currently Known*	LSST Discoveries**	Typical number of observations+
Near Earth Objects (NEOs)	~25,500	100,000	(D>250m) 60
Main Belt Asteroids (MBAs)	~1,000,000	5,000,000	(D>500m) 200
Jupiter Trojans	~10,000	280,000	(D>2km) 300
TransNeptunian Objects (TNOs) + Scattered Disk Objects (SDOs)	~4000	40,000	(D>200km) 450
Comets	~4000	10,000	?
Interstellar Objects (ISOs)	2	>10	?





The uncertainty in the size distribution for most solar system populations leads to fairly large uncertainties in the total number of objects the Rubin Observatory is expected to discover after 10 years, however the survey is expected to detect on the order of 100,000 NEOs and between 5 to 9 million MBAs.



Jones et al, 2018