An Overview of the Large Synoptic Survey Telescope (LSST) System

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The Large Synoptic Survey Telescope will provide the astrophysics and astronomy communities with a leap in wide field survey capability. The LSST will be a community resource, with broad access to the data and no proprietary data withholding period. We encourage the community to think about how they might exploit the LSST data, and in particular how frequent multiband imaging, to 24th magnitude, could enable innovative new science.

The LSST system has 3 main components: 1) the telescope and optics, 2) the wide field imager, and 3) the system software. Significant developments have taken place in all 3 areas, as highlighted in the companion posters. Salient features of the baseline LSST system design include

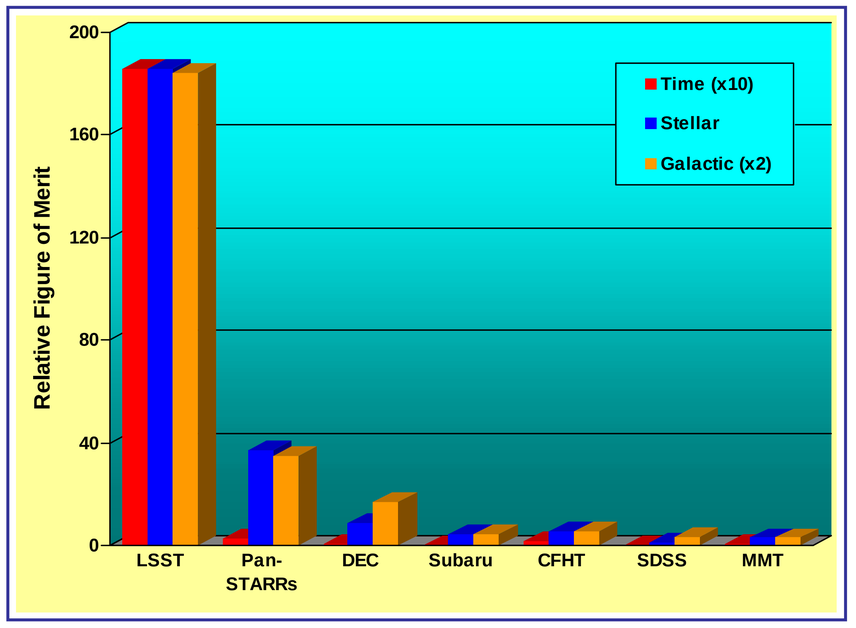
First light scheduled for 2013
Observing simulator suggests ~500 visits per field
Main LSST science goals include:
- Dark Energy/Dark Matter
- Galactic Structure
- Solar System Science
- Time domain astrophysics

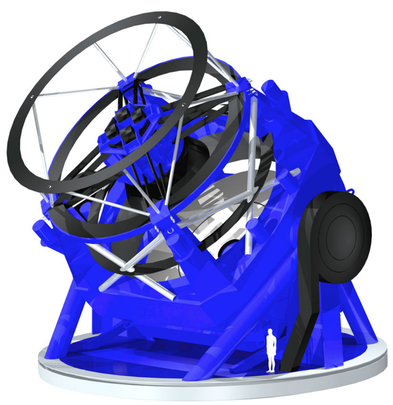
8.4m diameter primary, 6.5m dia effective collecting area
3.5 degree diameter field of view
0.2 arcsec per pixel, < 2 sec readout of 3 Gpix camera
Dual successive 10 sec exposures at each pointing
10 σ point source sensitivity of r = 24 AB mag in 10 sec time domain survey in g,r,i,z
30 sec latency for real-time image analysis

Full system simulations – We are developing an end-to-end simulation of the LSST system, including the effects of atmospheric propagation, optical transfer function, detector properties, and scientific signals of interest (in particular weak gravitational lensing).

Data access: The LSST data will be promptly provided to the community, with no proprietary data period.

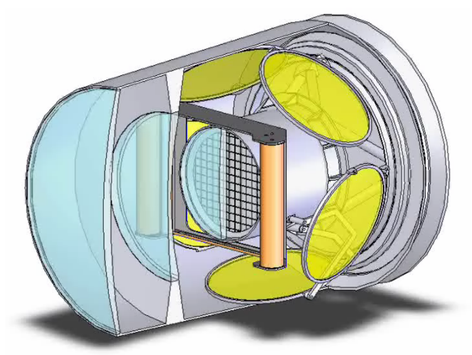
This plot compares the ability of LSST to survey the sky to a given depth (for time domain, stellar photometry, and surface brightness) to other facilities. These Figures of Merit are simple functions of the etendue, or the AΩ product of the LSST (318 m^2 deg^2), the exposure time to reach sky, and the seeing footprint. The LSST will open up a qualitatively new regime in survey science.





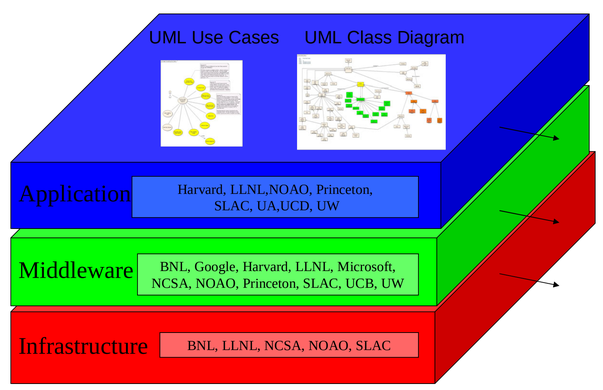
LSST Telescope

Revised optical design provides 318 m^2 deg^2 throughput
Tertiary mirror now coincides with primary surface
Atmospheric Dispersion Corrector assessed as unnecessary
Primary mirror contract signed with Steward Mirror Lab
Lowest structure resonance is at 10 Hz.
Site selection process under way



LSST Camera

3 Gigapixels at 0.2 arcsec/pixel
Department of Energy consortium engaged in camera construction
All spherical corrector lenses
Spherical incident wavefront on axis allows for ease of testing
Conceptual design for shutter and filter changer completed
Readout system architecture design study under way
Detector optimization studies under way



LSST Data Management

Unified Modeling Language (UML) architecture nearing completion
3 regional consortia assembled for DM R&D phase
Fusion of astronomical algorithm and high performance computing communities
We will draw heavily on precursor projects, such as
• Deep Lens Survey
• ESSENCE supernova survey
• LONEOS survey
• MACHO survey
• SuperMacho survey
• Sloan Digital Sky Survey
• Pan-Starrs
• ...

www.lsst.org

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