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
- 3.5 degree diameter field of view
- 8.4m diameter primary, 6.5m dia effective collecting area
- 0.2 arcsec per pixel, < 2 sec readout of 3 Gpix camera
- 10 sec exposure rate at each pointing
- 10 µ point source sensitivity of r = 24 AB mag in 10 sec time domain survey
- 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).

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LSST Telescope

- Revised optical design provides 318 m² deg² throughout
- 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 arcsecond
- 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
  - ...