A wide-field ground based telescope, the LSST will obtain sequential images covering the entire visible sky every few nights. Using an 8.4m primary mirror and a 10 sq. deg. field of view this can be done in two photometric bands every three nights with exquisite astrometric and photometric accuracy, and image quality. The survey area will include 30,000 sq.deg. of sky with Dec>-33.5, and will be imaged multiple times in six bands covering the wavelength range 320–1050 nm. About 90% of the observing time will be spent in a deep-wide-fast survey mode which will observe a 20,000 sq.deg. large region about 1000 times during the 10-year long survey. With its total exposure time of 8 hours distributed over six photometric bandpasses (ugrizy), the deep-wide-fast survey data will serve the majority of science programs. The remaining 10% of observing time will be allocated to special programs such as Very Deep and Very Fast time domain surveys. We illustrate how LSST science drivers led to these choices of system design parameters.

**LSST Science Drivers**

Major advances in our understanding of the universe have always come from dramatic improvements in our ability to "see". In the past decade, the large-scale sky surveys have become increasingly appreciated. As a sensitive, multicolor survey over most of the sky, LSST will dramatically impact nearly all fields of astronomy and many new areas of fundamental physics. The essence of LSST is to go deep, wide, and fast, and this strategy will enable an extremely broad range of scientific investigations. The main science themes that LSST will address, and that are used to optimize the system design, are:

**Constraining Dark Energy and Dark Matter**

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**Constraints on LSST's Endure**

Detailed consideration of LSST science drivers results in a requirement to obtain multi-band imaging of 20,000 sq.deg. to a depth of V=24.5 (5-sigma for unresolved sources, on either an AB or Vega based system). The primary depth drivers are the number of galaxies usable in weak lensing analysis and the ability to detect main sequence stars at 100 kpc. With the field of view area limited to 10 sq.deg., by achievable image quality, the time to complete such a survey scales with the square of the primary mirror’s diameter. As illustrated in Figure 1, in order to complete the survey in 10 years, the chosen effective diameter of LSST’s primary mirror is 6.5m (8.4m geometric diameter).

**Constraints on Exposure Time**

The total exposure time per field and for all six bandpasses is 8 hours. The weak lensing and other systematics are minimized by maximizing the number of realizations of the seeing. The minimum exposure time which maintains high survey efficiency is about 30 seconds and results in about 1000 exposures, each of which reaches a V magnitude of 24.5. At this pace, the 10,000 sq.deg. of sky visible at any given time can be tiled in two bands every three days.

The total number of visits in each band after 10 years of surveying are listed in Table 1. This combination of the depth, area, and revisit time simultaneously addresses the needs of LSST’s main science themes (see Figure 2). The revisit time of several days will result in well-sampled light curves for Type Ia supernovae, and will enable astrophysical studies of moving objects. Detection of moving objects will also benefit from short exposure time preventing trailing losses. A per-visit depth of V=24.5 will allow LSST to fulfill the Congressional mandate to detect 90% of 140m NEOs, to detect RR Lyrae stars to 400 kpc, and to make geometric parallax measurements for a complete solar neighborhood sample down to the hydrogen-burning limit.

**LSST Sky Coverage**

The LSST will be sited on Cerro Pachon in northern Chile. From that site, sky regions with Dec>-33.5 deg. can be observed at an airmass of 2 or smaller, a limit that is used to define the LSST Survey. This airmass results in a 0.6 mag loss of sensitivity at 500 nm compared to an observation in zenith (due to both seeing degradation and atmospheric absorption), and corresponds to an observable area of 31,000 sq.deg. Sky regions with -35<Dec<-15 can be observed at an airmass of 1 or smaller, providing especially good image quality for weak lensing and other science investigations that require it. The total accessible solid angle in this range exceeds 20,000 sq.deg., outside of the confusion-affected parts of the galactic plane. Figure 3 summarizes these constraints in equatorial and galactic coordinates. The current implementation of these and other constraints in a simulated LSST survey are discussed in detail in the accompanying poster by Pinto et al. (86.04).