The LSST design is driven by four science themes and desire to engage broad science community and general public in LSST data exploration. The current design, with an 8.4m (6.7m effective) primary mirror and a 9.6 square degree field of view, will allow about 10,000 square degrees of sky to be visited twice per night, with an effective depth of r=24.5 per visit, every three nights. The system will yield high image quality as well as superb astrometric and photometric accuracy, and will regularly produce three classes of data products. Level 1 data products are generated continuously every observing night, including alerts to objects that have changed flux or position, that will be made available within 60 seconds. Level 2 data products will be made available via an annual Data Release. Level 3 data products will be created by scientific teams using suitable Applications Programming Interfaces (APIs) and will provide about 50 teraflops of user-dedicated processing capability and 12 petabytes of user-dedicated storage. These capabilities will reside "next to" the LSST data, avoiding the latency associated with downloads.

### 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 decades, large-scale sky surveys have become increasingly appreciated. As a sensitive, mosaic 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 wide, fast, and deep, 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:** using a variety of probes and techniques whose synergy will fundamentally test our cosmological assumptions and gravity theories. LSST will provide a sample of 35 million galaxies with excellent photometry and shape measurements over 100,000 clusters of galaxies, and a sample of several million Type Ia SNe.
- **The Inheritance of the Stellar System:** and extending the boundaries of our reach in distance and selectivity of potentially habitable extrasolar planets. LSST will detect and characterize over 85% of 140 km larger lattice asymptotic, severe mission non-lattice asymptotic, and over 100,000 trans-Neptunian objects (e.g. Sedna-like objects will be detectable to beyond 200 AU).
- **Exploring the Transient Optical Sky:** by characterizing known classes of objects and discovering new ones, LSST will sample a variety of time scales ranging from 10 sec. to the white sky every 3 nights, with 1000 visits distributed over 10 years.

### LSST Sky Coverage

The two dashed blue lines outline the 24000 deg$^2$ region for which minimum airmass reaches values less than 1.4. The galactic plane regions with the highest stellar density are enclosed by solid red lines and include 1000 deg$^2$. The LSST Sky Coverage will be divided into six different bands (UV to near-infrared). The LSST will survey 20,000 deg$^2$ to this depth.

### Constraints on LSST's Endurance

Detailed consideration of LSST's science drivers results in a requirement to obtain multi-band imaging of 20,000 degrees square to a depth of r=27.5 (for unresolved sources, on either an AB or Vega-based system). The potential depth per observation on the number of galaxies usable at weak lensing analysis and the ability to detect main sequence stars at 100 pc. With the new field of view limited to 10 square degrees by achievable image quality, the time to complete such a survey scales with the number of visits. As illustrated in Figure 1 (top right), to complete the survey in 10 years, the chosen effective diameter of LSST's primary mirror is 6.7m (6.4m geometric diameter).

### Constraints on Exposure Time

The total exposure times per field and for all six bands 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 visits, each of which reaches a V magnitude of 24.5. At this pace, the 10,000 square degrees of sky visible at any given time can be seen in two bands every three days. The total number of visits in each band after 10 years of surveying is about 30,000. The combination of the depth, area, and time resolution simultaneously addresses the needs of LSST's four main science themes (see Figure 2, top right). The revisit time of several days will allow LSST to fully characterize the largest 10% of 1600 NEIs, detect R-I Delta Lyman stars to 400 pc, and make parallax measurements for a complete solar neighborhood sample down to the hydrogen burning limit.

### LSST Sky Management System

The LSST Sky will be divided into 6 main regions (UV to near-infrared). From the top, these regions are Dec < -33.5 degrees, Dec > -33.5 degrees, Dec < 90 degrees, Dec > 90 degrees, Dec > -33.5 degrees, and Dec < -33.5 degrees. The LSST Sky Management System will also provide about 50 teraflops of user-dedicated processing capability and 12 PB of user-dedicated storage. The key aspect of these capabilities is that they will reside "next to" the LSST data, avoiding the latency associated with downloads.