The LSST Exposure Time Calculator was developed to model the effects of LSST design changes on signal-to-noise ratio and survey depth. The ETC utilizes proposed LSST optical design, filter transmission, and CCD response, and incorporates a sky brightness model based on data taken at CTIO, UKIRT, and SDSS.

The Exposure Time Calculator allows the source spectral energy distribution, surface brightness profile, and redshift to be varied, and includes a library of stellar and extragalactic source spectra. Source and background spectra are modified for atmospheric effects and passed through the telescope and camera. The ETC uses the spectral curves to estimate both the signal-to-noise ratio for a single exposure, and the exposure time required to achieve a threshold signal-to-noise. The aperture for both background and source measurements can be specified, and an option for psf-weighted photometry is provided.

Variable Observing Conditions
- Seeing (n/sfmm)
- Cloud Cover
- Airmass
- Lunar Elevation
- Airmass
- Lunar Elevation
- Moon/Observation Angle

Photometry and Signal-to-Noise Calculation Options
- Multiple exposures of a specified time and fraction of exposure on source
- Total SNR for n exposures or number of exposures required to achieve a specific SNR
- Fixed software aperture or the aperture which gives optimal SNR
- Counts within a specified aperture or PSF-weighted photometry

Study of Sky Emission for LSST
A study of Sky Brightness under moonless conditions was done using data from the Sloan Digital Sky Survey, the Deep Lens Survey, Southern Standard Stars, and UKIDSS. The sky brightness was calculated by converting the sky brightness values to zenith, flux averaging, and converting back to AB magnitudes/arcsec^2.

Modeling the Effect of Scattered Lunar Light
The contribution of scattered lunar light to sky brightness was studied using moonlight observations from the Southern Standard Stars and UKIDSS. Our model extends the V band model of Krisciunas & Schaefer to the SDSS ugriz and UKIDSS Y systems. The model parameters are lunar elevation, phase angle, airmass, and moon observation angle.

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References

Visit the LSST ETC at http://www.lsst.org/Science_for_scientists.shtml