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LSST: the physics of the dark universe¹

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The Large Synoptic Survey Telescope (LSST) is the most ambitious proposed optical sky survey. Three recent nationally endorsed reports by the U.S. National Academy of Sciences concluded that a dedicated wide-field imaging telescope with an effective aperture of 6-8 meters is a high priority for planetary science, astronomy, and physics over the next decade. The main LSST survey will yield contiguous imaging of over half the sky in six optical bands, with each sky location visited about 1000 times over 10 years. The resulting samples of several million Type Ia supernovae and ten billion galaxies will provide percent level precision in dark matter, dark energy and other cosmological parameters by utilizing methods such as standard candles, standard rulers and growth of structure - all as a function of redshift. By simultaneously measuring structure growth and luminosity and angular distances as functions of redshift, LSST data will tell us whether the recent cosmic acceleration is due to dark energy or modified gravity. The shape of the power spectrum of dark matter fluctuations will measure the sum of neutrino masses with an accuracy of 0.04 eV or better, and the time delays of strongly lensed variable objects, such as supernovae and quasars, will provide additional independent tests of dark energy.

¹For the LSST Collaboration