Large Synoptic Survey Telescope

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Developments in Telescope & Site

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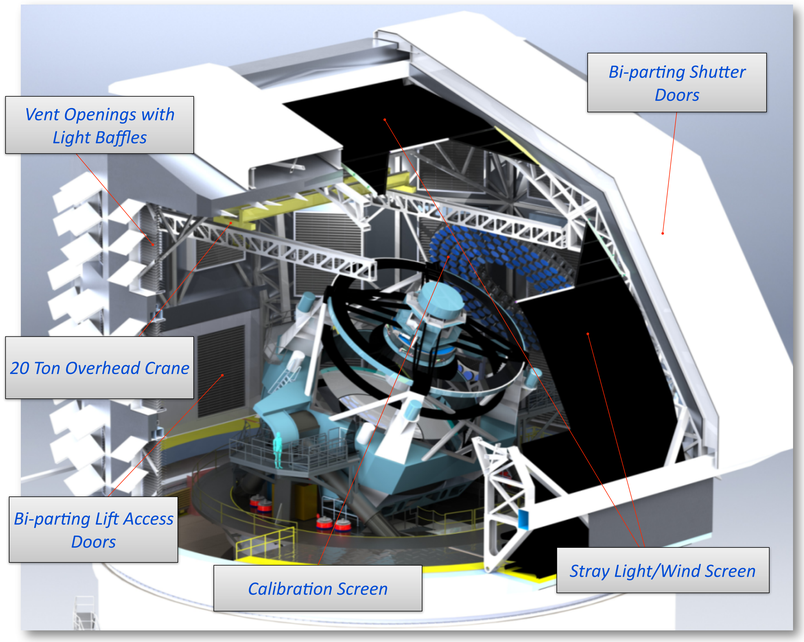
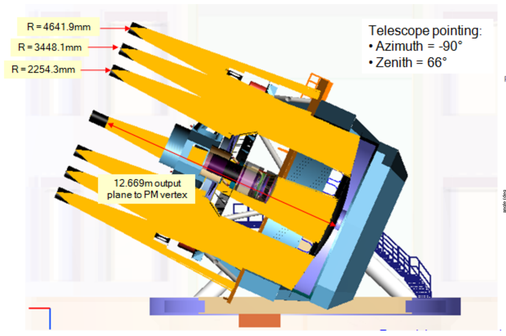
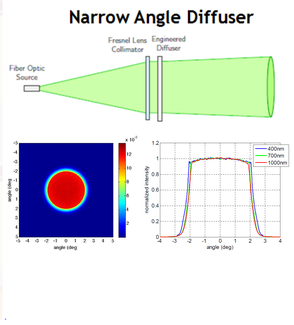
The LSST Project continues to advance the design and development of an observatory system capable of capturing 18,000 deg^2 of the sky uniformly in depth in six wavebands over ten years with a 3.5 degree field of view optical system and 3.2 billion pixel camera. The telescope and site engineering designs to support the mission have developed to a preliminary state and construction activities using non-federal funds are proceeding in the areas of mirror fabrication and early site development. Fabrication of each of the mirrors has started using private funds: an 8.4 m primary (M1) and 5.0 m tertiary (M3) built into a single monolithic substrate and the 3.5 m diameter secondary (M2). Optical fabrication of the unique M1/M3 monolithic mirror has entered final front surface optical processing. Loose abrasive grinding of the M1 surface is complete and has begun on the M3 surface. Polishing will follow and final optical testing is planned in mid 2012. Several critical aspects of the support systems for these mirrors have been prototyped and further risk reduction prototypes are planned. The telescope design has been advanced to include revised baffling that works more efficiently with the dome stray light and wind screen. Design of the dome has been modified to include the positioning of an updated calibration screen. The design of the summit facility is now 90% complete -- a state sufficient to reveal many of the building details to support operations on the summit including the service and maintenance activities. The active optics wavefront system has been prototyped and shows that the alignment and mirror surface specifications can be met.

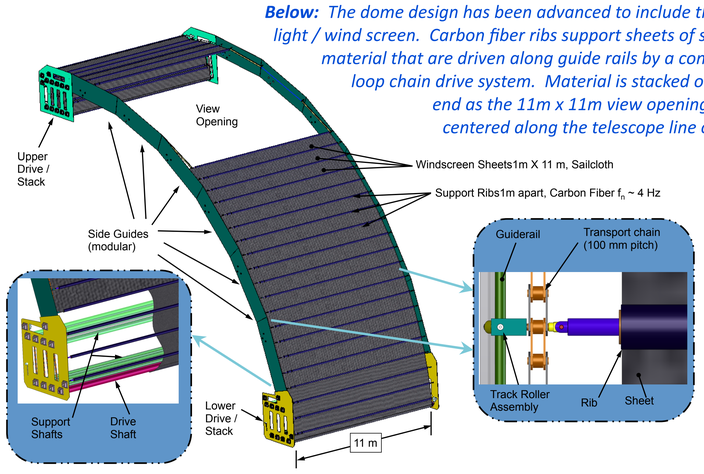


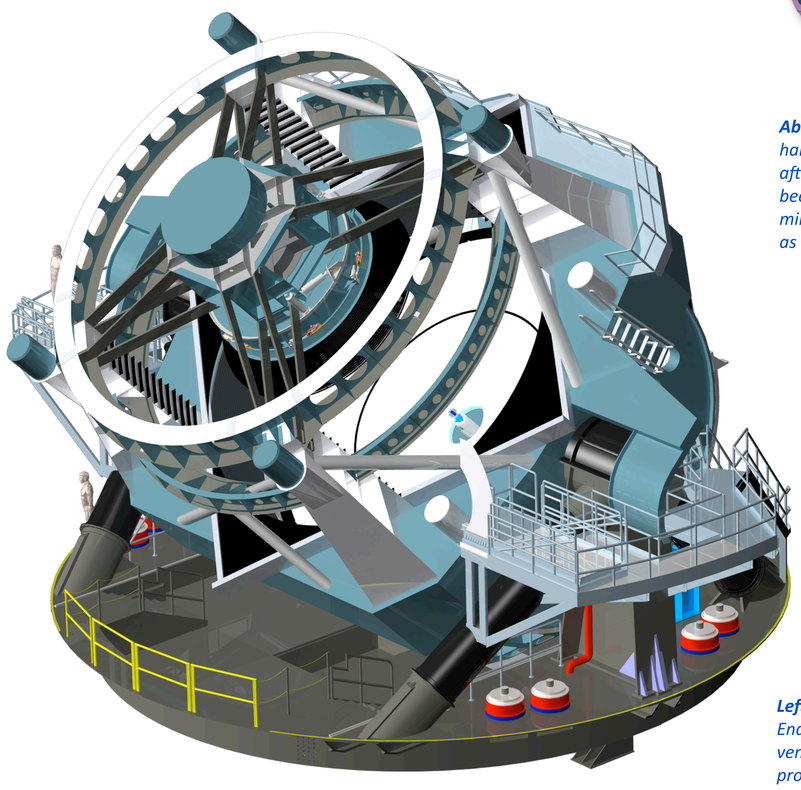


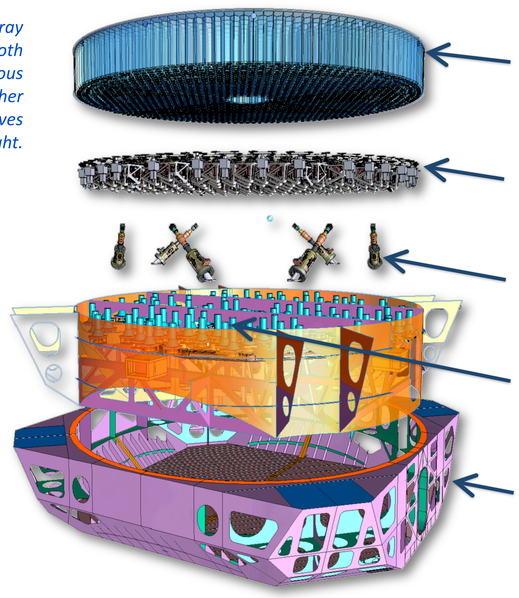


Above: *The Calibration Screen is a fiber-fed array of projectors attached to the dome wall. The tunable laser source is collimated and feeds a custom diffuser to uniformly project light across the LSST field of view. This approach aims to increase efficiency and limit stray light artifacts. Calibrated photodiodes sample the output intensity for use in calibrating the total instrument response.*

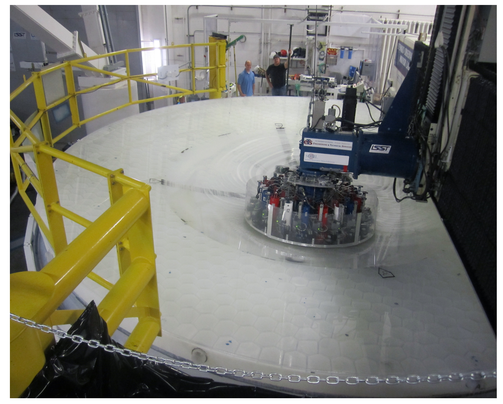
Below: *The dome design has been advanced to include the stray light / wind screen. Carbon fiber ribs support sheets of sailcloth material that are driven along guide rails by a continuous loop chain drive system. Material is stacked on either end as the 11m x 11m view opening moves centered along the telescope line of sight.*





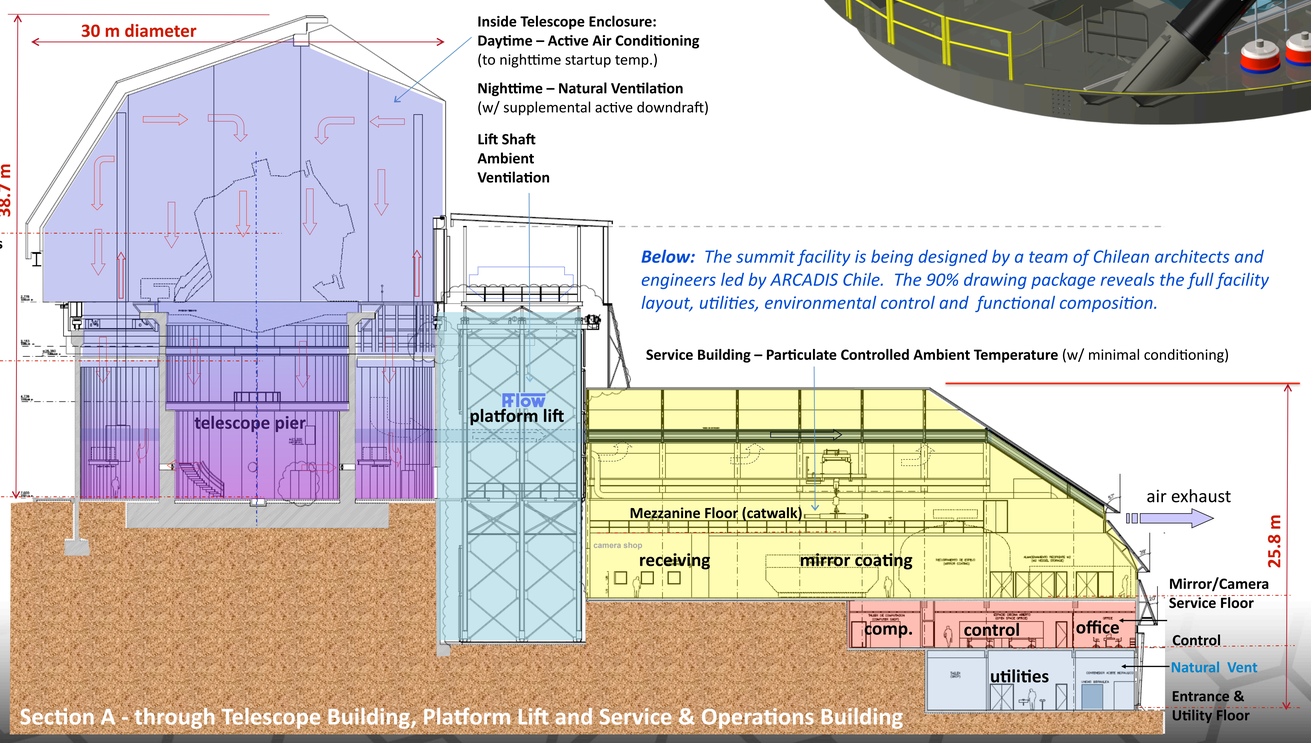


Above: *The Primary mirror cell, shown in an exploded view, continues to be the focus of design, analysis and hardware prototypes. The force actuators have been designed to be consistent with legacy pneumatic actuators after significant testing of air cylinders and valve response. A fully functional hardpoint actuator prototype has been developed and tested to demonstrate performance. The thermal control system design is complete and the mirror cell structure design is complete meeting all on telescope and vacuum chamber structural requirements as well as interface and maintenance access requirements.*



Left: *The Primary mirror fabrication at the Steward Observatory Mirror Lab continues to progress. Loose abrasive grinding of the Primary surface has been completed and the Tertiary surface is currently being ground with 20 micron grit compounds. The mirror is still scheduled for delivery in the last half of 2012.*

Left: *The telescope mount design is shown following revisions to include improved baffling structures on the Top End Assembly. The system of mount baffles work in conjunction with the dome stray light / wind screen and vent openings to mitigate unwanted illumination paths. A comprehensive FEA model of the mount, pier, and site properties was produced and utilized to optimize the dynamic properties of the telescope.*



Section A - through Telescope Building, Platform Lift and Service & Operations Building

Below: *The summit facility is being designed by a team of Chilean architects and engineers led by ARCADIS Chile. The 90% drawing package reveals the full facility layout, utilities, environmental control and functional composition.*

Below: *The LSST site on Cerro Pachón is shown following the early site leveling effort completed with non-federal LSST Corporation funding. This effort has allowed further inspection to verify the excellent rock condition, has provided valuable feedback to the summit facility architect, and will directly shorten the critical path for construction .*

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