



Contribution ID: 58

Type: **Poster contribution**

The Optical system for the Large Size Telescope of the Cherenkov Telescope Array

Saturday, 1 August 2015 15:30 (1 hour)

The Large Size Telescope (LST) of the Cherenkov Telescope Array (CTA) is designed to achieve a threshold energy of 20 GeV. The LST optics is composed of one parabolic primary mirror 23 m in diameter and 28 m focal length. The reflector dish is segmented in 198 hexagonal, 1.51 m flat to flat mirrors. The total effective reflective area, taking into account the shadow of the mechanical structure, is about 368 m². The mirrors have a sandwich structure consisting of a glass sheet of 2.7 mm thickness, aluminum honeycomb of 60mm thickness, and another glass sheet on the rear, and have a total weight about 47 kg. The mirror surface is produced using a sputtering deposition technique to apply a 5-layer coating, and the mirrors reach a reflectivity of ~94% on average at 370 nm. The mirror facets are actively aligned during operations by an Active Mirror Control system, using actuators, CMOS cameras and a reference laser. Each mirror facet carries a CMOS camera, which measures the position of the light spot of the optical axis reference laser on the target of the telescope camera. The two actuators and the universal joint of each mirror facet are respectively fixed to three neighboring joints of the dish space frame, via specially designed Interface Plate. In this contribution, we will overview the design and validation of each component in the optical system for the LST prototype.

Collaboration

CTA

Registration number following "ICRC2015-I"

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Session Classification: Poster 2 GA

Track Classification: GA-IN