

Null Corrector Design for the Primary Mirror of Discovery Channel Telescope

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Collaborator: Large optical shop at University of Arizona



DCT primary mirror

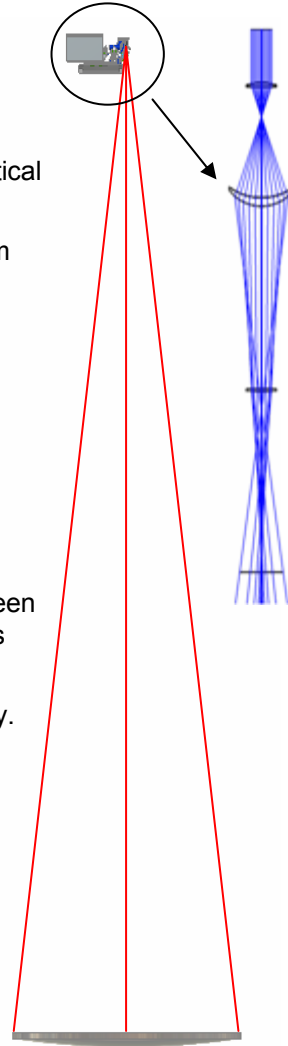
- The DCT is Lowell Observatory's project.
- The mirror blank was completed by Corning Inc.
- The final figuring and polishing will be finished at large optical shop at the University of Arizona, Tucson.
- The primary is a 4.3m hyperbolic-shape mirror with 176 μ m aspheric departure.
- The test of the primary mirror includes
 - Laser tracker test
 - Infrared interferometric null test
 - Visible interferometric null test

Outcome

- The infrared null corrector and the diverger lenses have been designed, fabricated and inspected. The optical system has been re-optimized based on measured results.
- The IR hologram has been fabricated and is under delivery.
- The visible hologram has been designed and is under manufacturing.

Ongoing Work

- The visible null corrector design
- Assembly of the null corrector
- Calibration of the null corrector with CGH



Technical Challenges

- The ghost issues for the infrared null correctors
 - Since the reflectivity of the IR lenses is relatively high, the ghost reflection from each surface of the lenses will cause a huge problem. We study different configurations of the null corrector and find the optimal one.
- The calibration of the null correctors
 - We will calibrate the null correctors in both IR test and visible test using computer-generated hologram (CGH). For visible test, we will use quadrant CGH to remove the writing error of the CGH.
- Specify the final mirror surface in terms of structure function

Value

- This 4.3m UV/visible/IR telescope has significant capabilities for solar system and astrophysical research.
- This telescope will feature active optics, alignment capability, and both prime focus and Ritchey-Chretien focus positions
- This telescope will be utilized to develop educational programming about astronomy and technology.
- The expected completion date for DCT is in 2010. For more information, please visit <http://www.lowell.edu/DCT/>.