

# *Laser Vision*



*Gemini Observatory Legacy Image*

*Image Credit: Gemini Observatory/AURA/Manuel Paredes*



The Gemini Observatory is operated by the Association of Universities for Research in Astronomy, Inc., under a cooperative agreement with the National Science Foundation on behalf of the Gemini Partnership.



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## Laser Vision

This exterior shot of the Gemini South telescope shows the result of the Gemini Multi-conjugate adaptive optics System (GeMS) with the Gemini South Adaptive Optics Imager (GSAOI) propagating a laser guide star skyward. The laser's light is split into five separate beams that are necessary for the Gemini South adaptive optics system.

The GeMS/GSAOI system is a revolutionary approach to adaptive optics in astronomy. The technique samples the turbulence structure in the atmosphere at several levels and then uses a technique similar to medical tomography to reconstruct a 3D snapshot of how the atmosphere is distorting starlight. This is then used to shape a series of deformable mirrors to cancel out this distortion. All of this happens about 1,000 times a second.

In the sky to the upper left of the dome, floating like detached fragments of the Milky Way, lie the Large and Small Magellanic Clouds. These glowing orbs are actually irregular dwarf galaxy companions to the Milky Way some 200,000 light years distant.

Gemini dedicates this image to the memory of Vincent Fesquet, who worked tirelessly to make the Gemini South Laser Guide Star System work efficiently and reliably.

## Gemini Observatory Facts

### PRIMARY MIRRORS:

Diameter: 8.1 meters; 26.57 feet; 318.84 inches

Mass: 22.22 metric tonnes; 24.5 U.S. tons

Composition: Corning Ultra-Low Expansion (ULE) Glass

Surface Accuracy: 15.6 nm RMS (between 1/1000 - 1/10,000 thickness of human hair)

### TELESCOPE STRUCTURES:

Height: 21.7 meters; 71.2 feet; 7 stories (from "Observing Floor")

Weight: 380 metric tonnes; 419 U.S. tons

Optomechanical Design: Cassegrain; Alt-azimuth

### DOMES:

Height: 46 meters; 151 feet; 15 stories (from ground)

Weight: 780 metric tonnes; 860 U.S. tons (moving mass)

Rotation: 360 degrees in 2 minutes

Thermal Vents: 10 meters; 32.8 feet (width – fully open)

### GEOGRAPHICAL DATA:

Elevation: Gemini North: 4,214 meters; 13,824 feet / Gemini South: 2,737 meters; 8,980 feet

Location: Gemini North: 19°49.4'N; 155°28.1'W / Gemini South: 30°14.5'S; 70°44.8'W

To see this, and many other images, please visit: <http://www.gemini.edu/legacyph>