

MT. HOPKINS OBSERVATORY

The elevation of Mt. Hopkins is 8,585 feet. It is named for Gilbert A. Hopkins who was killed by Apaches on 17 February 1865 in the same incident that took the life of William Wrightson. The two men were surveying mining claim disputes involving the Santa Rita Mining Company (the Salero, Ojero, Asugrero, Bustillo and other old mines). Wrightson was the Superintendent of the company and Hopkins worked for the company as a mining engineer.

Mt. Hopkins occupies a unique position in the Astrophysical World. Southern Arizona has been famous for its dark skies, clear nights and minimum air turbulence that make it ideal for locating observatories. In 1958, Kitt Peak was selected as the site for a national observatory. In the late 1960s, the need for another observatory arose and the Smithsonian Institution in conjunction with the University of Arizona built an observatory on the top of Mt. Hopkins. It was dedicated on 23 October 1968 as the Smithsonian Astrophysical Observatory and is currently known as the Fred Lawrence Whipple Observatory.



Hopkins - View from Super Trail

The large structure located at the peak of Mt. Hopkins is known as the Multi Mirror Telescope or MMT. The original MMT was built in 1979 and consisted of six identical 1.8 meter (about 6 feet) telescopes mounted in a single altitude-azimuth (naval gun-type) mount. The light gathered by each of the six telescopes was combined at a common focus. This gave the MMT the light gathering power equivalent to a telescope having a single 4.5 meter (about 15 feet) primary mirror. The telescope was the first to be fully controlled by computers. At that time, it was impractical to build mirrors larger than about 5 meters (about 16 feet). The 200 inch Palomar Telescope had a 16 2/3 foot mirror.

In the early 1980s, the University of Arizona began developing techniques to cast large, lightweight telescope mirrors from Pyrex-like glass. U of A Optical Scientist Roger Angel pioneered the process of “spin-casting” very large mirrors. The mirror blanks are first cast in a spinning oven. The glass is fused into one piece and the spin imparts an initial concave surface. In 1985, the University of Arizona and the Smithsonian proposed a \$20 million project to convert the MMT by removing the multi mirror telescope and installing a single, large diameter mirror in the housing. Casting of the new



Multi-Mirror Building - 2015

mirror commenced in April 1992. Polishing began in April of 1996 and was completed in October 1997. In 1998, the old multi mirror telescope was removed and the building modified to accommodate the new mirror.

In March 1999, the large metal ring that was to be installed in the structure to hold the mirror was hauled to the top of the mountain. The “Tuesday Group” from the GVR Hiking Club was hiking on Montosa Ridge on 16 March and observed the operation although at the time, they just thought that it was a trial run for the delivery of the mirror. The mirror was subsequently delivered and installed. The installation was quite a feat since the mirror weighed about 20,000 pounds and is 6 1/2 meters (about 21 feet) in diameter. It was secured to its handling fixture by 36 pads that were glued to the face of the mirror.

Before the new telescope could be used, it had to have a reflective surface applied to the mirror. Because of the size of the mirror and the requirement to periodically recoat it's surface, a procedure had to be developed to coat it in place. A vacuum chamber was designed that could be clamped to the front of the mirror blank. Air is pumped out until a vacuum is achieved. Current is then applied to tungsten filaments that have been coated with aluminum and are located inside the vacuum chamber. The aluminum vaporizes and coats the mirror surface. The first time the procedure was tried in August 1999, some tungsten also vaporized and contaminated the mirror. This reduced the reflectivity of the mirror to about 50% so the mirror had to be cleaned and the procedure attempted again. In February 2000, the coating was stripped off with a weak acid and the coating procedure tried again in April. This time it worked and the resulting reflectivity was about 80%. The third attempt at applying the aluminum coating was considered to be a complete success.

When first installed, the MMT was the largest optical telescope (6.5 meter mirror) in North America. It was 2.5 times as powerful as the old MMT and its field of view was 15 times greater. The University of Arizona Mirror Laboratory soon began developing even larger mirrors and the MMT lost its distinction. In 2004, two 8.5 meter mirrors were installed in the Large Binocular Telescope on Mount Graham.

The MMT is just one of the features of the Fred Lawrence Whipple Observatory. Some of the other features of the observatory include a 1.5 meter telescope, a 1.2 meter telescope, a 1.3 meter Infra-red Imaging telescope, a 10 meter gamma ray imaging telescope and most recently, a new gamma ray system called the Very Energetic Radiation Imaging Telescope Array System (VERITAS). The VERITAS underwent quite an agonizing effort to finally get it installed on Mount Hopkins. The original installation was to be located on a 10 acre site (referred to as the Montosa Site) near the access road past the Whipple Visitor Center and a few hundred yards from the site of a Native American Sweat Lodge. The proposed site for the VERITAS was contested by the Native American Group and eventually denied. An alternate location on Kit Peak was attempted but did not work out. The VERITAS was eventually installed in the vicinity of the Whipple Visitor Center and became operational in April 2007. The VERITAS consists of four gamma ray imaging telescopes with 12 Meter reflectors. One of the Veritas telescopes is shown in the photograph below.



Astronomer Dormitory near "Bowl"
Picnic Site - 2015



View of Other Observatory Facilities Mt.



Veritas Gamma Ray Telescope

Summarized in October 2000 by T. Johnson from articles appearing in the Arizona Daily Star and the Green Valley News. Updated by T. Johnson in August 2015 from Wikipedia web sites. The photo of the Veritas Telescope was added in 2024. All photos by T. Johnson.