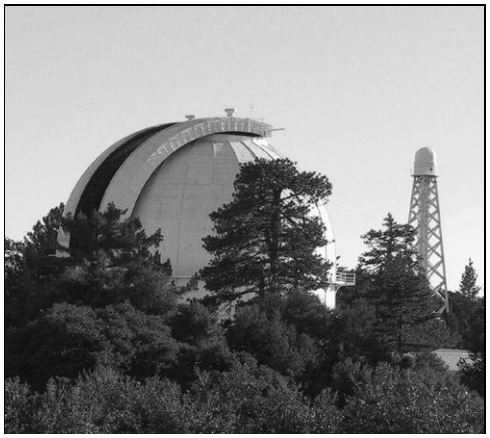
WELCOME TO THE MOUNT WILSON OBSERVATORY



The most scientifically productive astronomical observatory in history, this was the preeminent facility in the world in both stellar and solar studies during the first half of the twentieth century.

Modern instrumentation has enabled both the original superb telescopes and more-recently-built facilities here to continue Mount Wilson's pioneering heritage in new fields of study.

VISITING HOURS

DURING MOST OF THE YEAR, THE MUSEUM, THE 100-INCH VISITOR'S GALLERY, AND MUCH OF THE OBSERVATORY GROUNDS ARE OPEN TO THE PUBLIC DAILY FROM 10:00 A.M. TO 4:00 P.M. (WEATHER PERMITTING).

FROM DEC. 1 THROUGH MARCH 31, THE OBSERVATORY IS CLOSED TO THE PUBLIC, EXCEPT FOR SPECIAL TOURS. CHECK www.mtwilson.edu UNDER "VISITING INFORMATION".

TOURS

FROM APRIL THROUGH NOVEMBER, GUIDED PUBLIC TOURS BEGIN AT 1:00 P.M., ON SATURDAYS AND SUNDAYS, IN THE PAVILION AREA.

SPECIAL TOURS MAY BE RESERVED YEAR-ROUND (WEATHER PERMITTING). CONTACT MR. GALE GANT AT tours@mtwilson.edu.

VISITORS:
PLEASE OBSERVE THE **"PRIVATE AREA"** SIGNS. MANY OF THE ASTRONOMERS AND STAFF LIVE HERE AND SLEEP DURING THE DAY.

FOR MORE INFORMATION:

MOUNT WILSON OBSERVATORY: ....www.mtwilson.edu

60-FOOT SOLAR TOWER: …………………………..…. physics.usc.edu/solar

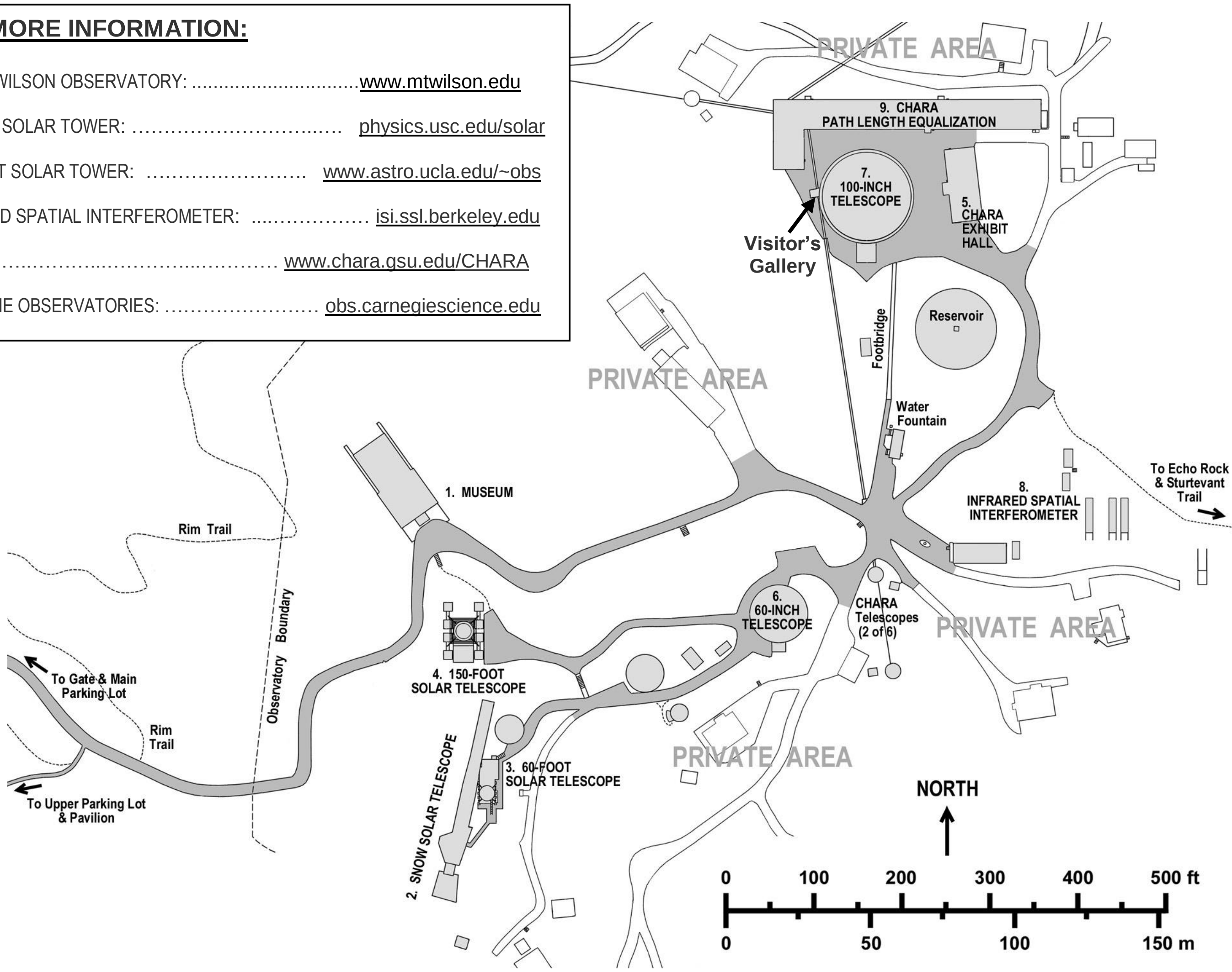
150-FOOT SOLAR TOWER: ……………………. www.astro.ucla.edu/~obs

INFRARED SPATIAL INTERFEROMETER: ...……………. isi.ssl.berkeley.edu

CHARA: ……………...………...………… www.chara.gsu.edu/CHARA

CARNEGIE OBSERVATORIES: …………………… obs.carnegiescience.edu

Numbered locations on the map below are described on the following pages:



OBSERVATORY HISTORY

The Mount Wilson Observatory was founded in 1904 by the newly established Carnegie Institution of Washington (D.C.), under the leadership of George Ellery Hale, who had previously founded the Yerkes Observatory in Wisconsin. He was later largely responsible for Caltech, Palomar Observatory, the Huntington Library, and the Pasadena Civic Center.

Hale was a pioneer in the "new astronomy" of astrophysics, in which the latest discoveries in physics are applied to studies of the Sun, planets, stars, and Universe. He was especially interested in the Sun, since it is the closest star and by far the easiest to study. The site was originally (until 1919) known as the Mount Wilson Solar Observatory.

The observatory was built on this site because of the superb "seeing" here, the best in North America. Good seeing means low levels of the image-smearing atmospheric turbulence that also causes stars to appear to twinkle. On a typical night here the stars overhead appear steady, allowing high magnification by the large telescopes. This seeing is not affected by light pollution from the nearby cities.

The Mount Wilson Institute, a non-profit organization, now operates the observatory under an agreement with the Carnegie Observatories, Pasadena, which still owns the observatory.

All the components for the original telescopes were laboriously hauled 9 miles from the valley floor, up a narrow, winding dirt road, initially on mule-drawn wagons. That road can still be seen cutting across Mt. Harvard, directly south of the observatory. (Angeles Crest Highway was not built until 1935.)

1. ASTRONOMICAL MUSEUM

The present museum was built in 1937, replacing an earlier, smaller structure. On display are many of the early high-quality photographs taken through the observatory's telescopes. Note the scale model of the observatory made in the 1920s. Also shown are a fly-ball governor originally used in the clockwork drive that guided one of the telescopes, one of the original mirror-polishing tools, and more. Various diagrams and brochures describe the current activities.

2. THE SNOW SOLAR TELESCOPE

Originally donated by Helen Snow to the Yerkes Observatory, this horizontal telescope was moved here in 1904. It became the first permanent instrument on Mt. Wilson, and gave the best solar images and spectrographic data up to that time. It is used now primarily for astronomical education.

3. THE 60-FOOT SOLAR TOWER

Built in 1908, this instrument pioneered vertical telescope layout and was immediately put to good use, when Hale discovered magnetic fields in sunspots (the first magnetic fields found outside the Earth). It is operated today by the University of Southern California (USC) for studies of helioseismology, improving our understanding of the interior of the Sun.

4. THE 150-FOOT SOLAR TOWER

Built in 1910, this telescope remained the largest such instrument in the world until 1962. It uses a novel tower-within-a-tower construction to minimize wind-caused vibration. Many types of solar research have been conducted here. Daily hand drawings of sunspots and their magnetic fields began in 1917 and continued today, providing a valuable uninterrupted record for researchers. The instrument, now operated by the University of California, Los Angeles (UCLA), is used primarily for recording the magnetic field distribution across the Sun's face several times a day. Analysis of these measurements over the long term is another invaluable tool in predictions of solar activity.

5. CHARA EXHIBIT HALL

Attached to the main CHARA office and control building near the 100-inch dome, this hall features attractive displays describing the operation and early results of the CHARA stellar interferometer array. These include diagrams of the optical system as well as detailed images of the surfaces of stars produced from analysis of the optical "fringes" produced by the interferometer.

The centerpiece of the exhibit hall is the world's first stellar interferometer, the 20-foot beam interferometer that was designed by Albert Michelson, the Nobel-Prize-winning physicist. It was installed periodically on top the 100-inch telescope between 1920 and 1930. Its resolution was adequate to measure the diameters of seven large stars (Betelgeuse, Arcturus, etc,). This pioneering instrument was the direct ancestor of modern interferometers such as CHARA and ISI.

6. THE 60-INCH TELESCOPE

This revolutionary telescope was completed in 1908. It quickly showed that large silver-on-glass reflectors were practical, establishing the basic design for future observatory telescopes. Its 5-foot-diameter mirror made it the largest telescope in the world until 1917.

Designed to operate in several different optical configurations to allow various types of research, it was the first large telescope built primarily for photographic and spectrographic use. One early accomplishment among many was the first measurement of the Milky Way galaxy's size and our position in it.

Used for visual observing, the 60-inch provides an amazing experience. Currently the 60-inch is used by private groups such as amateur astronomers, family groups, schools, etc. Full nights or half nights may be scheduled through the Mount Wilson Institute.

ADAPTIVE OPTICS

One of the most important techniques in modern astronomy is that of adaptive optics, which uses a small deformable mirror to correct for atmospheric distortion, providing about ten times the usual image resolution. The 60-inch telescope used an early version of this technique between 1992 and 1995, and proved its practicality. Two improved systems followed and were installed on the 100-inch where they were used for several years. Such systems are now relatively common on large telescopes.

7. THE HOOKER 100-INCH TELESCOPE

Named for the industrialist friend of Hale who funded the mirror, this instrument was completed in 1917. The largest telescope in the world until 1948, it has been used in every kind of nighttime astronomical research, including studies of stars, nebulae, galaxies, planets and their satellites, and much more. The best-known among the many discoveries made with this telescope were those of Edwin Hubble and Milton Humason in the 1920s, proving that spiral nebulae are distant galaxies outside the Milky Way, and that the Universe is expanding. These discoveries laid the foundations of modern cosmology and led to the present Big Bang theory.

The capabilities of the 100-inch are kept modern by using the latest instruments. In recent years it has been used by Harvard/Smithsonian and Jet Propulsion Laboratory scientists in the search for planets around other stars, for evaluating large numbers of stars as candidates for space observatories, and for studies of experimental laser communication with spacecraft.

The 100-inch can be viewed from the visitor's gallery.

8. THE BERKELEY INFRARED SPATIAL INTERFEROMETER

This unique instrument consists of three telescopes, each mounted in a truck trailer, for making measurements of stars at mid-infrared wavelengths with high angular resolution. It has been in use here since 1988, determining diameters of stars and the properties of the surrounding materials, such as composition, temperature, density, and distribution.

The ISI uses the microwave-signal-mixing principles common with radio telescopes but applies them at the much shorter wavelengths of thermal infrared radiation. It was built by, and is operated by, the University of California, Berkeley, under the direction of Charles Townes, co-inventor of the laser and Nobel Prize winner.

9. THE CHARA ARRAY

This is a six-telescope stellar interferometer array built and operated by Georgia State University's Center for High Angular Resolution Astronomy. Its 40-inch mirrors and 1080-foot maximum separation make it the largest such device in the world operating at visible wavelengths. The detail-resolving ability of interferometer arrays (and telescopes in general) depends on their diameter, so the CHARA array is able to see details of stars and the regions near them better than any previous instrument.

The six telescopes are arranged in a "Y" configuration, with two on each "arm". The two telescope domes of the south arm are visible near the 60-inch dome, as are the 8-inch-diameter vacuum pipes that carry the starlight from the telescopes to a central beam-combining building near the 100-inch dome.

Here the beam lengths are first equalized to one-millionth of an inch while compensating for the apparent motion of the stars and the spacing between the telescopes. This is done with a system of computer-controlled mirrors on precision motorized carts. These move on straight tracks 200 feet long in a room with extremely stable air held at a constant temperature. Next the beams are brought together and allowed to "interfere", producing "fringe" patterns unique to each observed object. Finally, computer processing can extract image details from the fringe patterns.