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 IS OPEN TO THE PUBLIC DAILY FROM 10:00 A.M.TO 4:00 P.M. (WEATHER PERMITTING).

BETWEEN DEC. 1 AND APRIL 1, THE OBSERVATORY MAY BE CLOSED TO THE PUBLIC. CHECK WITH www.mtwilson.edu UNDER "VISITING INFORMATION"

TOURS

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

SPECIAL FREE GROUP TOURS MAY BE SCHEDULED BY MR. GALE GANT AT galeg@mwoa.org

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 INSTITUTE: ………………………..... www.mtwilson.edu

MOUNT WILSON OBSERVATORY ASSOCIATION: …… www.mwoa.org

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

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

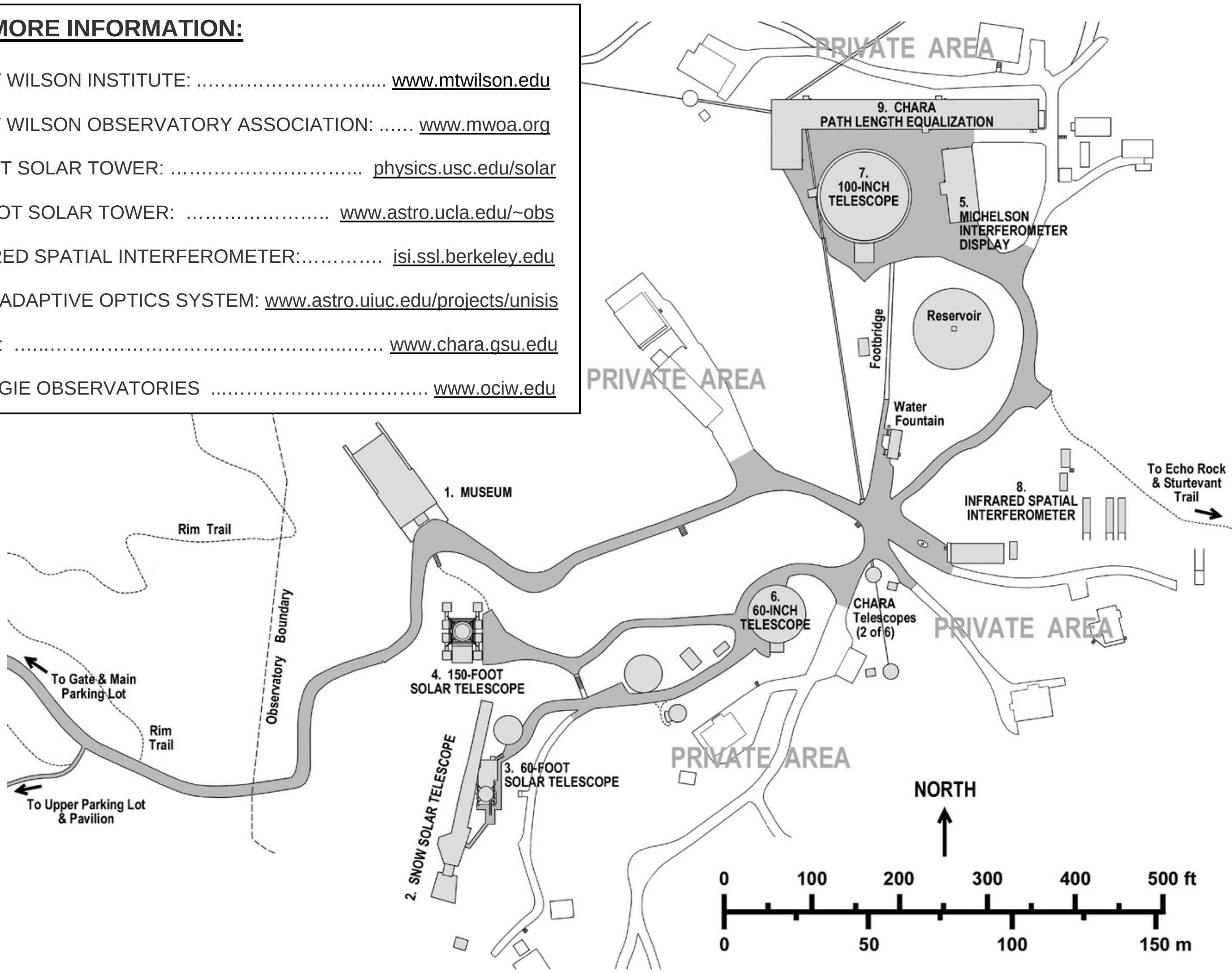
INFRARED SPATIAL INTERFEROMETER:…………. isi.ssl.berkeley.edu

LASER ADAPTIVE OPTICS SYSTEM: www.astro.uiuc.edu/projects/unisis

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

CARNEGIE OBSERVATORIES ……………………………. www.ociw.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 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 continue to this day, providing a valuable uninterrupted record for solar researchers. The instrument, now operated by the University of California, Los Angeles (UCLA), is used primarily for complete magnetic field measurements of the Sun's face.

5. THE MICHELSON 20-FOOT STELLAR INTERFEROMETER

Albert Michelson, the Nobel-Prize-winning physicist, developed this new type of astronomical instrument in the 1920s and used it to measure the diameters of several stars. This device consisted of a 20-foot steel beam, four flat mirrors (two of which were movable), and drive mechanisms all mounted atop the 100-inch telescope. Although limited to bright objects, it gave the resolving power of a 20-foot (240-inch) telescope.

Michelson observed the patterns resulting when the light from a single star was picked up by the two widely separated mirrors, reflected to the same point, and allowed to "interfere" with itself. Done carefully, with the two light paths precisely equal in length, this resulted in "fringe" patterns containing information on the star's size. This instrument, the predecessor to modern stellar interferometers such as CHARA and ISI, is mounted in the CHARA exhibit room.

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 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.

Currently the 60-inch is used by private groups such as astronomy clubs. Full nights or half nights may be scheduled through the Mount Wilson Institute.

16-INCH TELESCOPE

The newest telescope on the mountain is this 16-inch instrument of Schmidt-Cassegrain design. It can be used for direct viewing but is also equipped with a high-quality CCD camera for photography. Intended primarily for use by small groups of high school or college students, free of charge, it is also available to private individuals for a fee. Trained volunteer operators are included. Full nights or half nights may be scheduled through the Mount Wilson Institute.

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. Many new observing techniques were developed here.

The best-known discoveries made with this telescope were those of Edwin Hubble 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 for modern cosmology and led to the present Big Bang theory.

The 100-inch is kept modern by using the latest instruments. Studies continue, using computers and two state-of-the-art adaptive optics systems that compensate for most of the already-low atmospheric turbulence. One, operated by the University of Illinois, uses a laser to determine the degree of turbulence; the other uses the observed object itself. The 100-inch thus can see small astronomical details that rival those seen by the Hubble Space Telescope, which is itself named for Mount Wilson’s Edwin Hubble.

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 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 interferometer array built and operated by Georgia State University’s Center for High Angular Resolution Astronomy. Its 40-inch mirrors and 1100-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 will be 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.