

## Present site management

*Present use:* Meudon is currently one of the three sites of the Paris Observatory, the others being the historical (17th-century) Observatory of Paris itself and the radio-astronomy station at Nançay (Cher) founded in 1953.

*Protection:* The Château Neuf is scheduled as historical monument by a law passed on 12 April 1972.

*State of conservation:* A general renovation of the Meudon buildings was undertaken in 2001, respecting the scientific designation of the site and the original architecture and its decoration, and following the law for the protection of historical monuments in France.

*Context and environment:* The Château Neuf is itself a French heritage monument. The Duchess of Etampes, a favourite of François I, received the original Meudon Castle in 1527. New buildings were constructed during the 16th century, and at the end of the 17th century it acquired gardens designed by the architect Le Nôtre. In 1695, the castle was purchased by Louis XIV for the use of his son, the Grand Dauphin, and it was at this time that new outbuildings (those in which the astronomers work today) and the Château Neuf, the present building of the Grande Coupole, were constructed. After a period of decline under Louis XV and Louis XVI, Napoleon called for the restoration of the Château Neuf, but it was burned down during the war of 1870 and was in danger of disappearing completely. Astronomy is to be thanked for this not having happened.

*Management, interpretation and outreach:* As part of the Paris Observatory, Meudon is under the guardianship of the Ministry of Youth, Public Education and Research. The administration of scientific matters is the responsibility of the president, board of directors and scientific council of the Paris Observatory. The administration of the buildings is carried out by the president of the Paris Observatory and the Division Immobilière et Logistique (DIL).

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## Case Study 12.4: Mount Wilson Observatory, USA

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### Presentation and analysis of the site

*Geographical position:* Mount Wilson, Los Angeles County, State of California, USA.

*Location* (150ft solar tower): Latitude 34° 13' 28" N, longitude 118° 3' 31" W. Elevation 1740m above mean sea level.

*General description:* The Mount Wilson Observatory, founded in 1904, is one of a number of observatories built around the turn of the 20th century at mountain locations chosen for the quality of the astronomical seeing. It is one of three great observatories conceived by George Ellery Hale (1868–1938), a pre-eminent figure in the development of the best possible equipment for advancing solar and stellar astrophysics.



**Fig. 12.4.1.** Aerial view of the Mount Wilson Observatory: In the lower-left are the 150ft and 60ft solar tower telescopes; in front is the horizontal Snow solar telescope. The domes of the 60-in and the 100-in Hooker telescope are visible behind. Photograph © Norm Vargas (<http://www.mwoa.org/>).

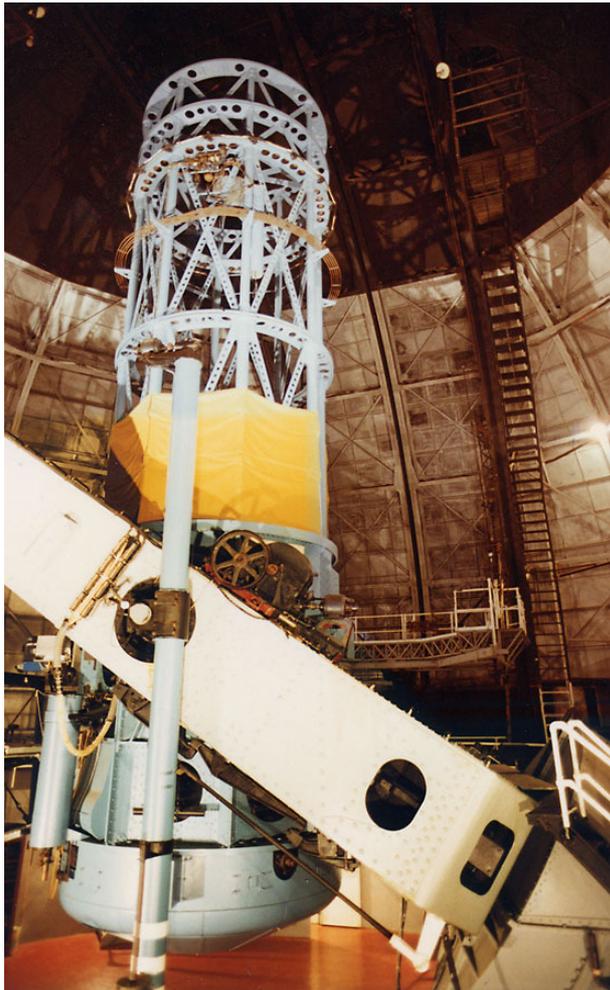
*Brief inventory:* The instruments at Mount Wilson include:

- The horizontal ‘Snow telescope’, built in 1903 by George W. Ritchey (1864–1945) and moved here in 1904.
- The 60 ft solar tower telescope (1904; the dome was not installed until 1914).
- The 150ft solar tower telescope (1910).
- The 60-inch (1.5m) silver-on-glass-mirror reflector, made by George W. Ritchey (1908).
- The Hooker 100-inch (2.5 m) equatorial reflector, also made Ritchey (1917).

*History of the observatory:* Hale, who was director of the Yerkes Observatory at Williams Bay, Wisconsin from 1895 until 1905, obtained a grant to found the Mount Wilson observatory from the Carnegie Institution of Washington (CIW). The mountain site provided near-ideal conditions for the world’s largest telescope, the 60-inch reflector, which went into service in December 1908. The even larger 100-inch reflector went into service in 1917.

Meanwhile, in 1904, the Snow telescope for solar observations was moved to Mount Wilson Observatory. It was not hugely successful, however, because the horizontal solar telescope was affected by air-currents from the warmed-up soil. For this reason, Hale had the idea of building a tower telescope, and the 60 ft solar tower telescope was duly constructed. In 1908 the larger 150ft tower was built with the help of the Carnegie Foundation.

Further technological progress was made in many areas during the following decades, examples being the photomultiplier tube and the development of the modern magnetograph (using fibre-optics) in order to improve the solar images.



**Fig. 12.4.2.** The Hooker Telescope (2.5m) used by Edwin Hubble for the discovery of the expansion of the Universe. Photograph © Andrew Dunn, Wikimedia Commons. Creative Commons Licence.

In 1984, the CIW was considering closing the Mount Wilson Observatory, but in 1985 it accepted the wishes of the Division of Astronomy and Astrophysics at the University of California at Los Angeles (UCLA) to use the towers for research in solar seismology, supported by the *Mount Wilson Observatory Association* (MWOA).

*Cultural and symbolic dimension of the site:* The importance of reflectors is directly connected to the rise of astrophysics. The new silvered-glass reflecting telescopes were essential for spectroscopy and photography because they had no chromatic aberration. The two glass reflectors at Mount Wilson (the 60-inch reflector and the Hooker telescope) represent the triumph of such reflectors at the beginning of the 20th century. The Hooker telescope remained the largest telescope in the world until 1949.

Mount Wilson saw the realisation by Harlow Shapley (1885–1972) that our solar system is not at or near the centre of our own galaxy (the Milky Way), arguably a 20th-century equivalent to the ‘Copernican revolution’; the realisation by Edwin Hubble (1889–1953) that globular clusters and spiral nebulae were in fact other galaxies outside the Milky Way; and the distance measurements, also by Hubble, that allowed him to present a linear distance-redshift relation which revealed that the Universe is expanding.

Mount Wilson was also of key importance in the development of solar astronomy. The solar tower, a special new architecture, was invented here, as were various new instruments for studying the solar atmosphere. Using the 60ft tower, Hale discovered in 1908 that sunspots have strong magnetic fields, several thousand times stronger than the Earth’s.

## Present site management

*Present use:* The observatory remains an active scientific institution, with both towers still being used for solar research.

*Management, interpretation and outreach:* Since 1986, Mount Wilson Observatory has been operated under an agreement with the CIW by the Mount Wilson Institute (MWI), a non-profit corporation whose mission focuses on scientific research, historic preservation, astronomical education and public outreach.

The Friends of Mount Wilson Observatory (FOMWO) offer visits of the observatory to the public. Visitors are given the opportunity to view the Universe through the 60-inch telescope, the largest telescope in the world available exclusively to the public.