

# Mount Wilson Observatory VIP Tour – August 31, 2013

by Nick Read

I was simply thrilled to learn of the planned Mt. Wilson Observatory VIP tour offered by The Los Angeles Astronomical Society. In particular, this observatory is probably my favorite of all the historic observatories I have visited over the years. Although Greenwich Observatory comes in a close second. We were quite fortunate to have such knowledgeable docents as our guides for the tour. Tim Thompson from the LAAS and former scientist with JPL was one of them and the other was Dave Jurasevich, Mt. Wilson Observatory Deputy Director.

This article is a re-telling of that wonderful day and I have included a number of photos to compliment the subject matter and to show you some of the goodies we were treated to. Most importantly this was a behind the scenes kind of tour that the general public does not get to see. I felt very special. The tour was cleverly split in half by our two docents. Tim showed us both the 60 foot and 150-foot solar towers and inner workings of the latter.

Then finished up the tour with an extensive visit to the Hooker 100 inch telescope. In between those Dave led us into the 60 inch telescope dome and allowed us the privilege of visiting the Monastery where George Ellery Hale's library is located. The other rooms included the dining room, kitchen and cook's quarters. Many famous astronomers have taken their meals in the dining room and rested in the individual guest rooms.

All the participating LAAS members were to meet at the Cosmic Café by 2:30 pm which was a great idea since I was famished by the time we arrived.

LAAS V.P. Giovanni Somoza gathered all the attendees together and organized us into two groups and soon we were off on our VIP tour with our respective docent. My group went with Tim and after a brief walk soon arrived at the 150-foot solar tower.



He pointed out the tower and some of its external workings and focused on the idea that unique to this solar telescope, was the construction of two towers, one within the other. The inner tower consists of a metal framework supported at ground level on four concrete piers. Surrounding each beam of this inner tower are square, hollow steel beams mounted on separate massive piers. The inner tower supports the optics at the top, while the outer tower supports the structure and dome at top. That way the optics are prevented from shaking in the wind, resulting in a very steady image at the base of the tower. Tim then concentrated on the science being done with the solar telescope.

He explained that the work being done at Mount Wilson quite literally gave birth to the science of astrophysics, and that the techniques being used by the researchers there were ground breaking and eventually became scientific standards

still being used today.

We were ushered into the telescopes control room where Tim spoke on the system used by solar astronomers to collect data



for study of the Sun's magnetic field and resulting cooler areas we have come to know as sunspots. The sunlight collected by the mirrors above is then passed down a long shaft and through a 75 foot diffraction grating/spectrograph then reflected back up into the control room where a researcher then scans the image electronically to obtain a current magnetogram which among other things, indicates daily sunspot activity.



In the chart Tim is pointing to, you can

see long-term changes in the sun's longitudinal magnetic fields. Red on the plot represents a minus or "South" field, and blue represents a plus or "North" field. Most obvious are the areas of strong solar activity which tend to start at high latitudes at the beginning of each solar cycle, then migrate down towards the solar equator. These areas of magnetic activity are where sunspots form during the period surrounding solar maximum. The fact that the sun has a fundamental 22-year magnetic cycle was discovered using 150-foot solar tower data by Carnegie astronomers George E. Hale and Seth B. Nicholson in 1925, and that the polar fields are also cyclic in nature was discovered by Carnegie astronomers Harold D. Babcock and Horace W. Babcock in 1952.



The tour continued with a short walk over to the original solar telescope installed at the observatory. Known as the Snow Telescope, the oldest telescope on the mountain, is named after the father of its benefactor, Helen Snow. She donated money for its construction at Yerkes Observatory in Williams Bay, Wisconsin. George Ellery Hale moved the telescope to Mount Wilson in 1904 to make observations of the Sun. Unlike the two tower solar telescopes that were built later, the light path for the Snow Telescope is horizontal. The building is long and originally was covered in canvas to keep the Sun from heating the ground along the light path of the telescope.



This was a fire hazard and the crude building was replaced with an aluminum shell in 1911. The spectrograph is located in a 15-foot pit. Many important observations were made with the Snow telescope and its instruments but tests soon indicated that a vertical construction would avoid some of the problems associated with heat from the sunlit ground near the mirrors. Shortly after going into operation in 1904, plans were started for building the 60-foot Solar Tower.

As the tour continued, our group was met just outside the 60-inch telescope by Dave Jurasevich - Deputy Director of the Mount Wilson Observatory. He brought us into the 60-inch dome at ground level but stopped in front of a row of lockers. He told us these were the lockers used



by some of the world-famous astronomers that have conducted research on the telescope. One of which was Edwin Hubble who was actually a staff astronomer at Mt. Wilson. Dave led us upstairs and on to the main floor of the observatory dome. We sat in chairs while



he recounted some historic moments during the telescopes lifetime and its achievements. He pointed out some of the old DC lighting still operational since originally being installed 100 years ago! Dave explained that the observatory was conceived and founded by George Ellery Hale, who had built the 40-inch telescope at the Yerkes Observatory outside Chicago. The Mount Wilson Solar Observatory was first funded by the Carnegie Institution of Washington in 1904. George Ellery Hale received the 60-inch mirror blank, cast by Saint-Gobain in France, in 1896 as a gift from his father, William Hale. It was a glass disk 7 1/2 inches thick and weighing 1,900 pounds. However it was not until 1904 that Hale received



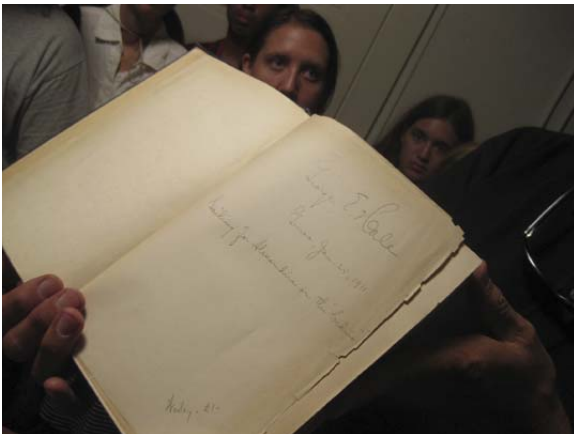
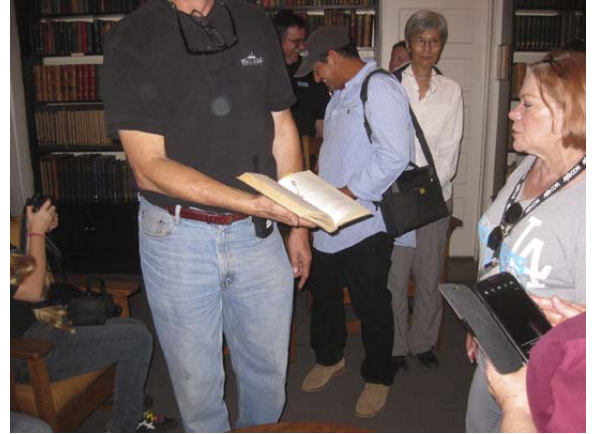
funding from the Carnegie Institution to build an observatory. After that, they dropped the word "Solar" from the observatory name. Grinding began in 1905 and took two years. The mounting and structure for the telescope was built in San Francisco and barely survived the 1906 earthquake. Transporting the pieces to the top of Mount Wilson was an enormous task. "First light" was December 8, 1908 and at the time, was the largest operational telescope in the world.



After visiting the 60 inch, Dave escorted us down a hill to where the Monastery stands. The Monastery is a dormitory for Observatory staff and visiting scientists. It is situated at the end of a peninsula with sharp drop-offs on three sides. Built in the shape of an inverted "J", its long wing has 14 rooms separated into "day" and "night" sections for visitors working on either solar or nighttime projects. The rest of the building includes cook's quarters, dining room and a combination library/living area. The original Monastery was destroyed by fire in 1908, a new, fire-resistant version was completed in 1909. This was a real treat because the public never gets to go inside the building, but we were about



to. After describing the sleeping quarters for daytime and nighttime researchers, Dave led us inside the Monastery. It was nicknamed that because women were not allowed to visit. Perhaps Observatory management felt they would be too distracting to the all male staff and visiting scientists. Once inside we were shown the various bedrooms that were once occupied by Hale, Hubble, and others over time.



Then Dave took us into the library which was filled with many of the texts written by the most notable scientific minds that are considered today the founding fathers of modern astronomy. Club members were shown autographed books by George Ellery Hale who was also very interested in Egyptology and had journeyed to Egypt



twice in his lifetime. Part of the library was also a sitting area where visiting scientific luminaries once sat around the fireplace and held conversations with each other. We were also shown the dining room where Edwin Hubble would ring the brass hand bell so that the kitchen would serve the next course. The other astronomers and techs would also have their meals at this table. Whoever was the lead observer on the 100 inch telescope that night, would be placed at the head of the table. The kitchen was just off this room but we did not enter it.



After leaving the Monastery, we hiked up a pathway on the way to the 100-inch Hooker Telescope as the Sun was starting to get low in the west, it was around 6:30pm. We were once again met by Tim Thompson who was to talk to us about the 100-inch Hooker Telescope and finish up the tour. The Hooker 100-inch telescope is named after John D. Hooker, who provided the funds for the giant mirror. It was the largest telescope in the world from 1917 to 1948 when the 200-inch telescope was built on Palomar Mountain 90 miles to the southeast.



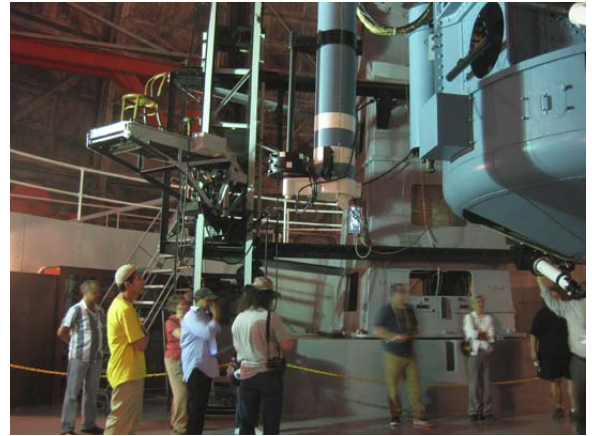
Tim guided us onto the floor of the big dome and showed us how the new observing scope and eyepieces were going to work. This was to help illustrate the new configuration for viewing through the 100-inch when it might become accessible to the public in 2014. Everyone was very excited at the prospect of looking through this big scope as it has never been available to anyone other than professional astronomers and researchers.

Tim showed us a portal where one could actually see the glass of the primary mirror and mentioned how all the bubbles we saw in it did not hurt the performance of the mirror. Also on display was the old plate holder that Hubble used so many years ago to photograph the Andromeda Galaxy that allowed him to calculate its distance. That led to his red shift measurements and eventual realization that galaxies appeared to be moving away from each other.

Then we were asked to climb a set of steps up to the second level of the dome. After everyone was up there, Tim, who was standing below, rotated the massive dome and we all began to feel a little strange as the illusion of the floor and telescope moving became apparent. But it was actually us and the dome that were really doing the moving!

Tim showed us a portal where one could actually see the glass of the primary mirror and mentioned how all the bubbles we saw in it did not hurt the performance of the mirror. Also on display was the old plate holder that Hubble used so many years ago to photograph the Andromeda Galaxy that allowed him to calculate its distance. That led to his red shift measurements and eventual realization that galaxies appeared to be moving away from each other.

Then we were asked to climb a set of steps up to the second level of the dome. After everyone was up there, Tim, who was standing below, rotated the massive dome and we all began to feel a little strange as the illusion of the floor and telescope moving became apparent. But it was actually us and the dome that were really doing the moving!



But it was actually us and the dome that were really doing the moving!

Then a real treat awaited us. Tim told us to step through the doorway and out onto the catwalk that surrounds the exterior of the dome. Once everyone was out there, Tim once again rotated the dome so we could see the entire landscape



in 360 degrees. These were truly amazing views. The grand finale was of course the magnificent sunset that mother nature displayed for us as the dome turned towards the west.



Bravo Tim Thompson and Dave Jurasevich - Job well done and many thanks from the LAAS!