SUMMER . QUARTER / JUNE . 2015

REFLECTIONS

THE UNIVERSE EXPANDED HERE.

The Admirable Mr. Ellerman

by **M. MORGAN**

At age 18, George Ellery Hale enrolled in the Massachusetts Institute of Technology, conducting research during summers at his private Kenwood Observatory (adjacent to his parents' home). After graduation, Hale began full-time astronomical research at Kenwood, hiring photographer Ferdinand Ellerman to assist him. Ellerman, one year younger than Hale, had only a high-school education (much later, an honorary Master of Arts degree was conferred upon him by Occidental College in California in recognition of his services to astrophysics), but he had acquired considerable skill in photography and machine tools. Ellerman was a very quick study, rapidly gaining knowledge of astronomy's physical aspects, and especially solar spectroscopy.

Hale's hiring of Ellerman in 1892 began a nearly half-century relationship. As Walter S. Adams wrote on Ellerman's passing in 1940, "The combination of these two men was a very strong one — the active, brilliant mind of Hale constantly raising new problems in methods and apparatus in the solution of which the experience and rare observational skill of Ellerman were invaluable."

When Hale established Yerkes Observatory, Ellerman came along, contributing to the design, construction, and operation of a spectroheliograph for the 40-inch telescope and taking part in observations. Astronomers of these days of yore had more adventures than one might surmise, given the relative comfort of modern observing. In just one example, in May 1897, E. E. Barnard and Ellerman were scheduled to observe nebulae one evening using the 40-inch refractor at Yerkes. At around 12:45 A.M., the men heard a noise when they raised the elevated floor, but they could not discern the source of the sound. After two and a half hours of observation, Barnard uncharacteristically cut short his typical all-night observation. Soon after the two men left the building, the 37½-ton floor's supporting cable broke, and the floor crashed to the ground, exploding into a heap of rubble.

HUNTINGTON LIBRARY

A RELAXING MOMENT. George Ellery Hale and Ferdinand Ellerman enjoy the peaceful environment at Mount Wilson sometime around 1905. Perhaps Ellerman is wearing the "high mountain boots" that Adams described (see page 4), though the ten-gallon hat seems to be missing.

Ellerman was the first astronomer to join Hale in 1904 at the new solar observatory at Mount Wilson. (Walter S. Adams, E. E. Barnard, and

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ANNOUNCEMENTS

Mount Wilson Observatory Is Open to Visitors

Weather and roads permitting, Mount Wilson Observatory is open to the public every day for the season. Come on up to the mountain to enjoy the beautiful weather and uplifting surroundings! The Cosmic Café is open Saturdays and Sundays, 10 A.M. to 5 P.M., offering a variety of fresh-made sandwiches and other treats to visitors. At the café you may purchase a National Forest Adventure Pass and tickets for the weekend walking tours. The Cosmic Café is located in the Pavilion overlooking the large parking lot at the entrance to the Observatory. Members of Friends of Mount Wilson Observatory enjoy a 10 percent discount on food and memorabilia. We will see you at the top!

COSMIC CAFÉ

ABOUT US

The Mount Wilson Institute operates Mount Wilson Observatory on behalf of the Carnegie Institution for Science. Mount Wilson Institute is dedicated to preserving the Observatory for scientific research and fostering public appreciation of the historic cultural heritage of the Observatory. *Reflections* is published quarterly by the Friends of Mount Wilson Observatory (FOMWO).

INFORMATION

For information about the Observatory, including status, activities, tours, and how to join the Friends of Mount Wilson Observatory, visit our website at *www.mtwilson.edu*.

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For the use of historical photographs of Mount Wilson, we thank the Observatories of the Carnegie Institution for Science, the Huntington Library, Don Nicholson, and other sources as noted.

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PAGE ONE BANNER PHOTOGRAPHS

Star-forming regions in the Witch Head nebula in Orion, just off the hunter's knee, imaged by NASA's Wide-Field Infrared Survey Explorer. (Inset) Edwin Hubble at the Newtonian focus of the 100-inch telescope on Mount Wilson, circa 1923.

NEWS + NOTES

CUREA 2015 EDUCATION PROGRAM, JUNE 14–27

The 2015 CUREA (Consortium for Undergraduate Research and Education in Astronomy) program, now in its 26th year, is currently underway at Mount Wilson Observatory. Of the eight students enrolled this year, half are from the U.S. and half from abroad; the group is also balanced with four women and four men. The international students are from India, Afghanistan, Brazil, and South Korea. The U.S. students attend University of Vermont, University of Southern Mississippi, Los Angeles Valley College, and Kenyon College. New to the staff this year is John Varsik, Research Professor at the New Jersey Institute of Technology, based at Big Bear Solar Observatory. He is part of the team building and operating Big Bear's New Solar Telescope, the largest-aperture solar telescope in the world.

In the 2-week CUREA program, the first week is devoted to classroom sessions and both day and night observing. During the second week, each student pursues a unique observing/research project she or he has chosen, taking original observations, processing and analyzing the data, and reporting results to the group.

The students will operate Mount Wilson's 16-inch Meade LX200 telescope for their night-time program, with new drive controls in a new dome. The telescope drive control system was upgraded last fall with a system from Sidereal Technology that improves both closed-loop autoguiding and dead-pointing accuracy across the sky. This spring, the 16-inch was relocated to the Cooke Dome near the Monastery, formerly home to a 24-inch telescope used by the Telescopes In Education (TIE) program. The re-installation, led by MWO volunteers Ken and Larry Evans, makes room in the dome nearest the 60-inch telescope for the return of the 6-inch Brashear refractor, which is being restored by CHARA superintendent Larry Webster, with the assistance of CUREA staff member John Briggs.

OBSERVATORY COPES WITH HISTORIC CALIFORNIA DROUGHT

In the 112 years since Mount Wilson Observatory was founded, the current drought situation is the most challenging it has ever faced. The Observatory derives its water from two wells in the former Strains Camp, 300 feet below the potable water tank located between the 150-foot solar tower and the 60-inch telescope, where the water is pumped. Despite this season's 23.74 inches of rainfall, the upper well has not recharged at all. The lower well is recharging at a rate of about 1,000 gallons a week currently; however, it is impossible to forecast how long this will last.

Between March 2014 and March 2015, the Observatory used approximately 300,000 gallons of water. During the months of December through March, the Observatory operated on a minimal staff and was using an average of 400 gallons of water a day. Since April, when the staff and people visiting the Observatory increased, usage has gone up to about 500 gallons a day. Since the well is not refilling anywhere near as fast as the water is being used, water must be brought in, and mountain residents are taking stringent measures to conserve water. These include doing laundry and taking showers down in the city; bringing in bottled water for drinking; and re-using dishwater or using paper plates and dishes to minimize dishwashing.

—Bob Eklund

FOMWO Membership

All are invited to join the Friends of Mount Wilson Observatory. The Observatory receives no continuing state or federal support. You can help ensure the continued operation of this science heritage site with your tax-deductible gift. FOMWO offers a variety of membership levels and benefits. For information on how to become a FOMWO member, visit www.mtwilson.edu. The Observatory welcomes donations and volunteer efforts of all kinds, and we thank you.

MOUNT WILSON OBSERVATORY

Robin & Art

With sadness we note the passing of Robin Mason and Art Vaughan.

Robin, who died last month, co-produced *The Journey to Palomar* with her husband Todd. It debuted on PBS as a prime time special in 2008. What started in 1998 as a 30-minute documentary on the 200-inch telescope at Palomar that the Masons estimated would be a 12-month project morphed into an hour and a half labor of love on the life of George Ellery Hale, focusing to a great degree on Mount Wilson.

Robin did the bulk of the research on the project, spending countless hours in the archives at Caltech, Carnegie Observatories, the Corning Glass Works, and more. The more she learned about Hale, the deeper she dug into what she found to be his ever more complex life.

While tenacious as a researcher, she was also incredibly sensitive with the Hale family as to how she might portray GEH's mental issues in the film. In her work, she also brought many members of the family together who hadn't seen each other in decades or in some cases who hadn't even met.

Robin was a great friend of Mount Wilson and the Carnegie Observatories, and will certainly be missed.

The great truth for Mount Wilson is that without the initiative of Arthur Harris Vaughan, Jr. (1934–2015), there would be no current Mount Wilson and the astronomy still being done there. In 1984, the Carnegie Institute of Science, the owner of the facilities, decided to discontinue the operation of the place and move their focus to deep space telescopes in Las Campanas, Chile.

In stepped Art, formerly a staff astronomer at Carnegie in Pasadena, along with Bob Ferguson, with a solution for keeping the doors open. They would create an entity later known as the Mount Wilson Institute to manage the facilities on the mountain while Carnegie would continue their ownership.

It took a considerable amount of time to convince Carnegie of the merits of this proposal, but by 1989 they were up and running with Art as CEO albeit with no financial support from the mother ship.

In the early 1990s, Art helped bring in Robert Jastrow as Executive Director and later that decade persuaded Hal McAlister that Mount Wilson would be the ideal place for the new CHARA interferometric telescope array.

In 2003, Hal assumed the role of Executive Director of MWI and Art took the role of Deputy Director, as Hal was operating from Atlanta, Georgia. Art resigned that post in 2014 but remained Trustee until his passing in May.

Art was truly our Polaris. The multiplicity of tasks he performed and the wise counsel he offered since the genesis of MWI 30 years ago were without peer. Most of all he will be deeply missed as a dear friend.

—Sam Hale

DONATIONS IN HONOR OF ROBIN MASON CAN BE MADE TO — The Robin Mason Chamber Music Fund, www.masonconcerts.org

DONATIONS IN HONOR OF ART VAUGHAN CAN BE MADE TO — The Mount Wilson Institute, P. O. Box 94146, Pasadena, CA 91109

Ellerman — continued from page 1

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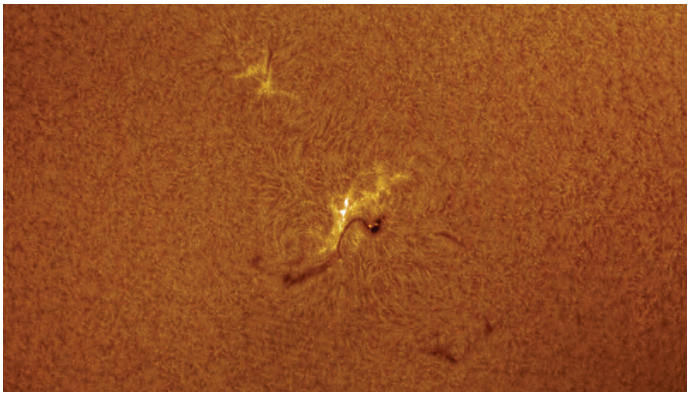
"HE COULD ALMOST INVARIABLY REPAIR IT." This 1915 photo of Ferdinand Ellerman shows him standing in a grease pit with an assortment of lubrication equipment including a cast-iron frying pan and spoon. Readers of the website *theoldmotor.com*, which featured the photo, opined that the vehicle is a 1912 Cadillac Model 30. Notice the differing tire treads.

Charles Backus became the other permanent staff members.) In "Early Days at Mount Wilson" (*Publications of the Astronomical Society of the Pacific*, 1947), Walter S. Adams noted that the "somewhat wild and primitive conditions on Mount Wilson were quite new to Ellerman and he enjoyed them greatly. The occasional rattlesnake and the almost mythical mountain lion provided the element of excitement, and he made elaborate preparations for meeting them. On my first trip up Mount Wilson, Ellerman and I met at the foot of the new trail. He wore a 'ten-gallon hat,' high mountain boots, and a full cartridge belt from which hung a revolver on one side and a hunting knife on the other. I was greatly impressed and pictured a struggle for existence on the wild mountain top, which bore little resemblance to later actuality. ... Together we explored many trails and climbed the higher mountains to the eastward. Ellerman was a most pleasant companion on all such expeditions, and recollections of these walks and of occasional games of golf in the valley form some of the pleasantest memories of these early years on the mountain."



ELLERMAN BOMBS seen in an image from *spaceweather.com* in 2007.

UNIVERSITY OF CHICAGO PHOTOGRAPHIC ARCHIVE

SEEMINGLY UNDAUNTED by physical difficulties, the expert photographer Ellerman is shown here with his large portrait camera atop the Smithsonian spectrobolometer shed. The Smithsonian Astrophysical Observatory made observations of the Sun's energy (the solar constant) at the invitation of G. E. Hale beginning about 1905.

Adams continued: "Ellerman's observing and photographic ability and experience, together with his ingenuity and mechanical skill, made him invaluable, especially during the years of construction and development on Mount Wilson. If anything went wrong with an instrument he could almost invariably repair it or at least make it operate temporarily. This ability was of immense value at a time when transportation was slow and difficult, and the 15 miles separating the Observatory from its instrument shop in Pasadena formed a gap which it took the better part of a day to cross. So during these early years we depended upon Ellerman in a thousand ways, and it was a rare occasion when he could not meet the emergency."

Ellerman was involved in field observations as well as those at Mount Wilson. The appearance of Halley's comet in 1910 saw him leading an expedition for the Astronomical and Astrophysical Society of America to Diamond Head on the island of Oahu. He and his team made "an excellent series of photographs of the comet" according to an account by E. E. Barnard published in the *AAS Journal*, 1915.

Ellerman's solar observations included the discovery of what are now known as "Ellerman bombs." He wrote in *The Astrophysical Journal* (1917) that, while "observing the hydrogen-alpha line for reversals and distortions in an active spot-group, there suddenly appeared a very brilliant and very narrow band extending four or five angstroms on either side of the line, but not crossing it." These transient, bright white explosions, according to observations posted on

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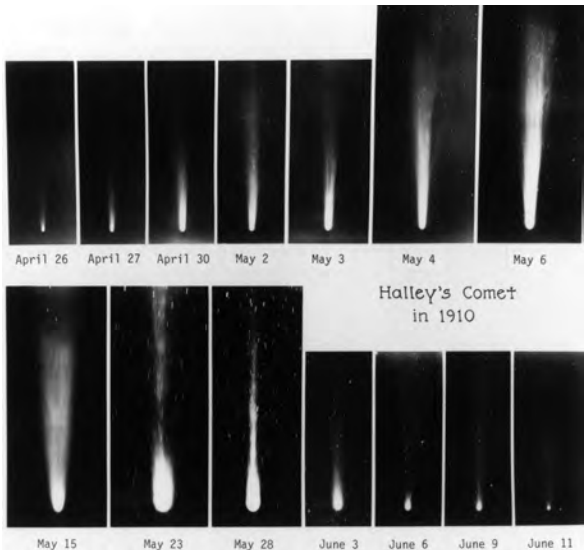

A SERIES of images of Halley's comet taken by Ellerman and his team on Oahu in 1910.

spaceweather.com in 2007, are likely to occur in areas of strong magnetic fields and are sometimes referred to as microflares, with an average life span of about 10 to 13 minutes (Ellerman gave a duration of only 1 to 3 minutes on average).

In 1932, Mount Wilson Observatory mounted an expedition to Lancaster, New Hampshire, to observe a solar eclipse. The driver of the truck was A. N. Beebe, the Mount Wilson machine shop foreman. The expedition participants included Walter Adams, the director; astronomers Seth Nicholson, Edison Pettit, and Theodore Dunham; photographer/observer Edison R. Hoge; and Ferdinand Ellerman. The sky was clouded over and no observations could be made, but Edison Hoge documented the journey and equipment setup at the Lancaster Fair Grounds site in a series of historic photographs (now in the possession of Virginia Hoge, Edison's granddaughter; one is shown here).

EDISON HOGE, COURTESY OF VIRGINIA HOGE

ASTRONOMERS FROM MOUNT WILSON OBSERVATORY setting up to view the 1932 solar eclipse. Left to right: Edison Pettit, Seth Nicholson, and Ferdinand Ellerman, who has donned overalls for the occasion. The person working under the Observatory's truck is most likely the machine shop foreman, A. N. Beebe.

Ellerman's distinctive mustache and goatee gave him a rather elfin appearance and he was known for his good humor and delight in impressing an audience. In a story recounted by Mike Simmons (a longtime Observatory supporter and volunteer), Ellerman would use the Sun to light his pipe. When visitors were watching him make an ascent to the top of the 150-foot solar tower, he would stop the elevator half-way up, take out his pipe, load it with tobacco, and, with great flair and expectation, pull a small lens from his pocket to form an image of the Sun on the tobacco to light it.

Ellerman's expertise in photography was invaluable at Mount Wilson, and many of the early photographs of the Observatory and surroundings were taken by him. He handled preparation of photographs for reproductions in publications as well. Having participated in the founding of both Yerkes and Mount Wilson Observatories, Ellerman was also called upon to help scout the location for the new 200-inch telescope, which, of course, ended up at Palomar Mountain.

His mechanical and artistic skills found another outlet: the scale model of Mount Wilson Observatory currently residing in the Museum was designed and built by him. Ferdinand Ellerman retired from the Observatory in 1937 but kept in touch with its activities and often visited his former colleagues. When he passed away in 1940, Adams wrote: "It is impossible to assess in any adequate way the numberless contributions he made to both [Yerkes and Mount Wilson] observatories. His friendly presence will be greatly missed by his associates of many years."

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EVEN IN THIS FORMAL PORTRAIT of Ferdinand Ellerman, about 1920, he seems to be suppressing a mischievous smile.

NOSTALGIC PRODUCE CRATE LABELS

During the glorious heyday of the practice of using eye-catching labels on produce crates, hundreds of colorful labels announced the products of numerous California farms and cooperatives. Fanciful names such as Miracle, Shamrock, SweeTreat, Old Mission Brand, All Year, Star of California, California Dream, Cowgirl, Comet, Silver Moon, Sierra Vista, Full o' Juice, and Airship were dreamed up, along with equally fanciful artwork for crates of fruits and vegetables. In California, local landmarks were notably featured, including Mount Wilson and Mount Lowe, as well as Palomar, with drawings of their respective observatory domes. Visit the website of the Mount Lowe Preservation Society, Inc., at *www.mountlowe.org* to see more colorful crate labels.

In the 1840s, railroads experimented with shipments of perishable foods cooled by ice (the so-called "refrigerator cars"). By the 1870s, with the completion of the Transcontinental Railroad linking the east and west coasts, the first labels had appeared on produce crates and fine artists were much in demand to create attractive images. A vast new market had been opened, especially for California farmers, and farmer-owned cooperatives set high standards for label design.

These imaginative marketing efforts of produce shippers to lure buyers boosted the railroad infrastructure and the growth of agriculture, fueling economic and social development along the way.

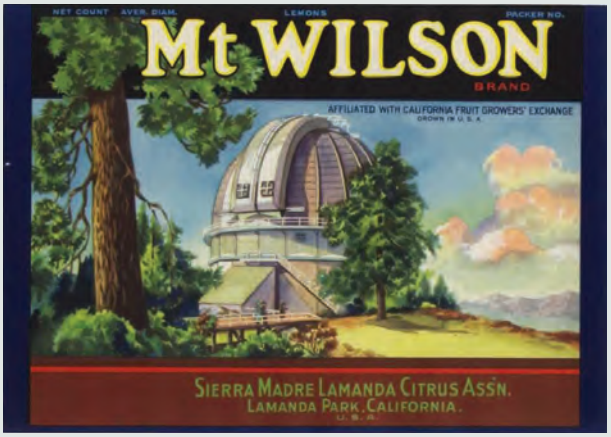
Cheaper, lighter cardboard boxes were adopted for shipping by the mid-1950s, quickly replacing the wooden crates along with the wonderful labels. Still, produce crate label artwork is appreciated to this day, and one can readily purchase original or replicated labels via the Internet to decorate one's walls.

— M. Morgan

On the Mt. Wilson and Mt. Lowe brand crate labels, note the address given for the Sierra Madre–Lamanda Citrus Association. Lamanda Park was originally a small township that was gradually enveloped by Pasadena, annexed in 1914. The Lamanda Park train station was where the 200-inch mirror for the Palomar Mountain telescope arrived in 1936 after its 3,000-mile journey from the Corning Glass Works, greeted by representatives of Mount Wilson Observatory as well as more than 5,000 spectators.

According to the Electric Railway Historical Association of Southern California, the Sierra Madre Line of the Pacific Electric Railway ran 17 miles from the 6th Main Station in Los Angeles to its Wilson Trail Terminal just above the city of Sierra Madre. Freight was handled over the entire length of the Sierra Madre Line, consisting of citrus traffic from packing houses in Lamanda Park and general freight to and from Sierra Madre.

Prior to World War II, the Sierra Madre Line also hauled passengers; this line gave easy access to the hiking trail up Mount Wilson. After 1944, though, passenger traffic declined, and the last passenger run was in 1950.



Expanding Our Public Outreach Activities

by **MICHAEL RUDY**

Last year we had great success offering a second, shorter tour on Saturdays at 2 P.M. (1 hour), June through August. This year we are expanding on that success by offering the 2 P.M. (1 hour) tour on both Saturdays and Sundays, June through August. Meet at the Cosmic Café to purchase your tickets.

We have also just added solar observing for the public — 2 P.M. to 4 P.M. on clear, sunny Saturdays and Sundays, until the end of October. Visitors can safely observe the Sun using our portable 100-mm Lunt solar telescope, generously donated by Lunt Solar Systems and Celestron, free of charge. You will find the telescope and our telescope operator by the Pavilion, in back of the Cosmic Café. Our founder, George Ellery Hale, was particularly interested in the Sun, as it is the easiest object by which to study astrophysics, the purpose of Mount Wilson Observatory.

The 60-inch telescope received new aluminization this year, allowing us to view the skies with a clarity we have not had in a couple of years. The 100-inch telescope is once again in use — this time for the public. Last year's pathfinder observing sessions on the 100-inch telescope gave us the confidence to open that exquisite instrument for the public. This year we plan to include the 100-inch telescope to public ticket observing sessions, just like the 60-inch telescope.

READY FOR SOLAR VIEWING. Michael Rudy shows off the solar telescope near the Cosmic Café. Visitors to the Observatory can safely view the Sun at no charge.

Exploring the Towercam

by **BOB EKLUND**

In the still sky-pond
Moon and her moondog-image
Reverberating.

Whisper of a moon
Comma in the night's story
Through the looking-glass.

In the sleeping domes
No one to view the splendor—
Just the Towercam.

No doubt you've already looked at the view from Mount Wilson via the Towercam, that little video camera perched atop the 150-foot solar tower (*obs.astro.ucla.edu/towercam.htm*). It's owned and operated by UCLA. If you've looked once or twice, you may think there's not much else to see. Think again, because the Towercam has secrets for you. For example, it can:

- Show you the current weather at Mount Wilson.
- Let you see above the clouds, when it's all socked in with a marine-layer cloud cover in the city.
- Give you incredible views of sunrises and sunsets.
- Give a snapshot of Los Angeles basin air quality and cloud cover.
- Let you sip a "moonlight cocktail" of the full Moon rising over the San Gabriel Mountains.
- Give you a peek at what's happening right now (a new image is downloaded automatically every two minutes) at the Observatory.

UCLA DEPARTMENT OF PHYSICS AND ASTRONOMY

TOWERCAM MOONDOG. Looking north from the 150-foot solar tower on the evening of November 3, 2009, the Towercam recorded a rare atmospheric phenomenon called a "moondog" (bright spot in cloud directly above the 100-inch dome). Moondogs, like their daytime cousins, sundogs, result when ice crystals in a high cirrus cloud are perfectly aligned to reflect the light.

The accompanying triple-haiku poem by Bob Eklund appeared in the AstroPoetry Blog of the Astronomers Without Borders website — *www.astronomerswithoutborders.org*. The AstroPoetry Blog features contributions from astropoets around the world.

MOUNT WILSON OBSERVATORY

Mount Wilson Institute
P. O. Box 94146
Pasadena, CA 91109

≈THIS SUMMER≈

VISITOR INFORMATION

OBSERVATORY STATUS

Welcome hikers, bikers, star-gazers, visitors of all interests! The Observatory and Skyline Park are open from 10:00 A.M. to 5:00 P.M. daily until November 30, 2015, weather permitting. The Cosmic Café at the Pavilion, offering fresh-made sandwiches and Observatory memorabilia, is open Saturdays and Sundays from 10:00 A.M. to 5:00 P.M. You may purchase a National Forest Adventure Pass at the Café for parking.

DOCENT-LED WALKING TOURS

Two-hour weekend tours of the Observatory are held on Saturdays and Sundays at 1:00 P.M. Meet at the Cosmic Café at the Pavilion to buy a ticket. Guests on these tours are admitted to the telescope floor beneath the historic 100-inch telescope. A one-hour tour that does not provide entry to the telescope leaves the Pavilion at 2:00 P.M. on Saturdays and Sundays, June through August.

SPECIAL GROUP TOURS

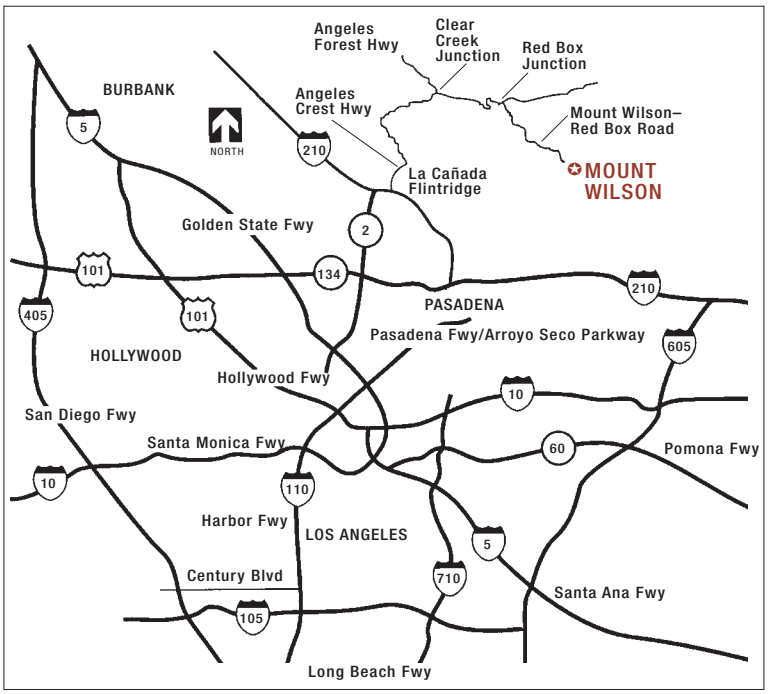
Group daytime tours are available. Reservations are required and a modest fee is charged. Groups can also place orders in advance for box lunches from the Cosmic Café. For information, please visit *www.mtwilson.edu*.

LOOK THROUGH THE TELESCOPES

Mount Wilson's 60-inch telescope and 100-inch telescope provide incredible views of some of the most beautiful objects in the night sky. For details on scheduling a viewing session, see *www.mtwilson.edu*.

PARKING AT THE OBSERVATORY

The U.S. Forest Service requires those parking within the Angeles National Forest and the National Monument (including the Observatory) to display a National Forest Adventure Pass. For information, visit *www.fs.usda.gov/angeles/*. Display of a National Parks Senior Pass or Golden Age Passport is also acceptable.

HOW TO GET TO MOUNT WILSON OBSERVATORY

From the 210 freeway, follow Angeles Crest Highway (State Highway 2 north) from La Cañada Flintridge to the Mount Wilson–Red Box Road; turn right, go 5 miles to the Observatory gate marked Skyline Park, and park in the lot below the Pavilion. Visit the Cosmic Café at the Pavilion, or walk in on the Observatory access road (far left side of parking lot) about 1/4 mile to the Observatory area. The Museum is opposite the 150-foot solar tower.