

# Bays Mountain Astronomy Club

☞ *Next Meeting: Dec. 5* ☞

## REFLECTIONS

Greetings fellow amateur astronomers! Before we know it, 2014 will be just a memory. Looking back over the November events, we ended the 2014 public StarWatches with not a lot of help from the East Tennessee weather. We did get a few nights that viewing was almost perfect. All I can say is, let's look forward to spring!

In the November meeting, we welcomed Matt Canon, a grad student at ETSU, and his research on BE stars. I have to admit that I did not know anything about BE stars. Matt's presentation helped me to at least understand a little about them. Matt's research demonstrated that there is much more research needed to increase our knowledge about this interesting topic. Thank you, Matt, for sharing your research and some of the goals for the future. I hope that you will continue your study and keep our club updated as to your progress.

Adam shared with the members his pictures from his trip to a planetarium conference in Florida in addition to images from the club picnic and StarFest. I was wishing I could have been a part of that conference. Thank you, Adam, for

BY WILLIAM TROXEL

sharing some of the experience with the members and guests.

Our Amateur Astronomer Corner presentation was how to set up your telescope. The purpose was to take it to the starting level with instructions for anyone who is just starting out or received a new scope and had no idea how to get started. You expressed the thought to offer this program every other month. Due to the annual dinner in January, we will not offer the Amateur Astronomer Corner until the February meeting which will showcase "How to Collimate Your New Go-To Mount." My goal is the presentation to be no longer than 10 minutes.

The annual dinner details are coming together very quickly. We have a keynote speaker and topic which was published on the web site in late November.

Once the location is set, I will need to get a rough count for the location. I will be asking for the count at the December meeting. Should you not be able to attend the meeting you can e-mail, text or call me. Kingsport will be this year's annual dinner city.



## Calendar

### Special Events

Jan. 7:30 p.m. Annual club dinner. Jeremy McLaughlin, Astronomy/Physics Teacher at Sullivan Central High School will speak on "Backyard Radio Astronomy: Significant Research with Insignificant Funds." Date and place TBA.

### SunWatch

Every Sat. & Sun., 3 - 3:30 p.m.,

Mar. - Oct., weather permitting.

BMACers are always welcome to help.

### StarWatch

Nov. 22, 29 6 p.m.

BMACers are always welcome to help with this nighttime viewing program for the public.

Please show up about 30 min. prior to help set up.

### BMAC Meetings

7 p.m., Discovery Theater:

Dec. 5 Christi Whitworth; Dir. of Education Outreach, PARI will speak on "Radio Astronomy & Smiley as an Outreach Tool."

Feb. 6 Program TBA.

6:30 p.m., Observatory:

Mar. 6 Observatory quick cleaning and other program TBA.

The next major outreach event for the club is the annual Astronomy Day at Bays Mountain Park. This year's event will be April 25. I have already started getting details for the displays. I hope to have a rough list of displays to share with you in the January article. Some of you have already passed ideas and helpful information to me, keep it coming because we need to get the final list ready no later than mid January. The success of this event depends on all of us together as a club. I am hopeful that each year the attendance increases at Astronomy Day.

*(Continued on page 5)*

## STAR STUFF

BY TERRY ALFORD

December promises to be an interesting month for star gazers. Let us start with our own star, the Sun. Activity on the Sun just keeps on going. In November, there was a huge sunspot group that was pretty complex in white light. On November 11, one of the largest prominences I have seen in months lit up the edge of the Sun. Did you get to observe the partial solar eclipse on October 23? I had forgotten about it until it was almost too late. I set up my scope just before the Sun dropped behind a ridge in my neighborhood. It was very clear and the Sun looked so neat with a big chunk (maybe 20%?) obscured by the Moon. Silhouetted on this view was the leafless skeletons of trees on the ridge line. Wish I had taken a photo. By the way, the Sun reaches the solstice on the 21st of the month, marking the start of Winter. Ugghh! The only good thing about this is that the days start getting longer.

Mercury goes through superior conjunction with the Sun this month so it will not be visible until very late in December. By December 31, it will shine at  $-0.8$  magnitude and less than  $4^\circ$  from Venus. The two inner planets together will make a good binocular view.

Venus, although low in the western sky, does grow in size and brightness and rises a little higher in the sky during the month. Even though it will shine at mag  $-3.9$  it will still be a difficult target unless you have a reasonably low horizon and clear skies. Through a telescope there is not much to see, just a small disk swimming in the Earth's atmosphere.

Mars is still visible in the evening sky until about three hours after sunset. It shines at about first magnitude and displays a disk of a little less than  $5''$  across. It moves from Sagittarius to Capricornus this month.

The biggest planet makes for the best telescopic planetary target this December. Mighty Jupiter starts out rising about 10 p.m., but by New Year's Eve, it will rise at 8 p.m. A great object for those new telescope Christmas gifts. It shines at brighter than  $-2.2$  magnitude and generally lies within  $7^\circ$  of Regulus in Leo. The disk size increases from  $40''$  to  $43''$  during the month. Jupiter reaches opposition in February.

You will have to be an early riser to see Saturn this month. It rises about an hour before sunrise on the 1st but two hours earlier by the end of the month. Saturn slowly moves from Libra to the head of Scorpius. It's wonderful ring system is tilted a little more than it has been earlier this year. All the better to view with that new Christmas scope or eyepiece, my dear.

Neptune and Uranus are best observed as soon as twilight ends. A scope will not show much more than a slightly greenish or blueish disk on either object. Still, if you haven't viewed them through your scope before, it is a good challenge to track them down. Finder charts are on the net.

The Moon is full on December 6 and new on December 21, the first day of Winter.

The Geminid meteor shower peaks this year on the nights of December 13 and 14. This is one meteor shower I used to ignore. It is

usually too cold and it is close to Christmas with all of the activity associated with the season. A few years ago I had surgery and was pretty much restricted to the house for a few days. It happened to be very clear the night of the peak of this shower and I ambled out into the backyard with a lawn chair and a sleeping bag to keep warm. I was treated to many bright meteors, very impressive. Since then I look forward to the Geminids. This year, the Moon will not be a major factor until near midnight. If it is clear, get out and enjoy some very bright meteors. And who knows, you might spot a sporadic fireball, too!

## HAPPY BIRTHDAY MOUNT WILSON OBSERVATORY

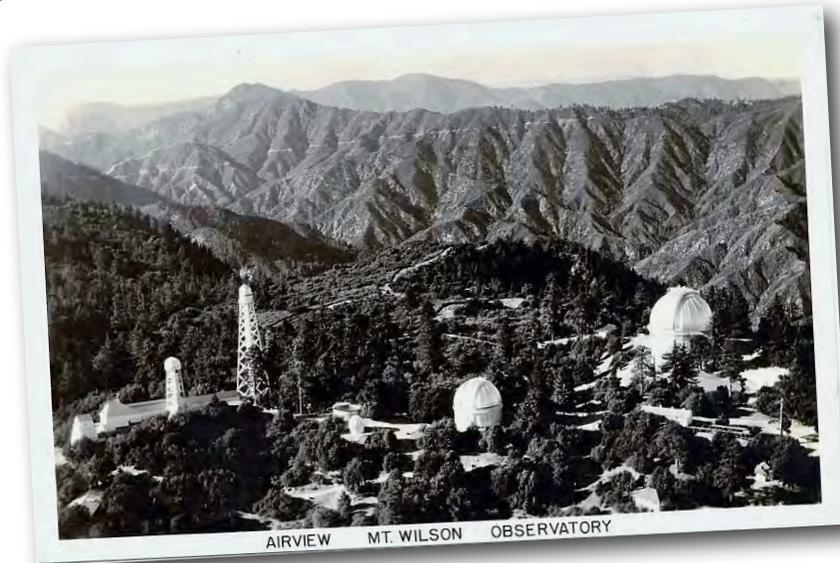
BY ROBIN BYRNE

This month, we celebrate the birthday of a major astronomical institution. It was the dream of George Ellery Hale to build a solar observatory on the 5,710 foot peak overlooking the, then, small town of Los Angeles, California. It had the advantage of steadier and more clear skies than Hale's previous location in Wisconsin at Yerkes Observatory. The land was leased from the Mount Wilson Hotel with the stipulation that the public must have access to the observatory. The funding was provided by the Carnegie Institution of Washington on December 20, 1904.

Hale's first priority was to use the location to observe the Sun, so the original name was Mount Wilson Solar Observatory. The first telescope put into use was the Snow Solar Telescope, which Hale brought from Yerkes, along with several scientists and engineers. Hale's plan was for Mount Wilson to be the first

observatory dedicated to the "New Astronomy" (now known as astrophysics). In particular, Hale wanted to understand the workings of the Sun and stars by analyzing their light. Using the Snow Telescope, studies of the Sun began in earnest in 1905. The Snow Telescope was used to better determine the solar constant, and the temperature of sunspots. Today it is used for public outreach and education. In 1908, the 60-foot solar

tower was completed. Using this instrument, Hale detected the Sun's magnetic field, which was the first time any magnetic field was discovered beyond the Earth. In 1912, the largest of the solar telescopes, the 150-foot telescope, was completed. Two years later, Hale discovered that sunspots reverse their magnetic polarity every 11 years. Later discoveries related to the Sun include measuring the Sun's change in size every 5 minutes and other oscillations that occur on the Sun.



*Mt. Wilson Postcard*

In 1896, Hale was given a 60-inch mirror blank from his father. Weighing 1,900 pounds, grinding of the disk of glass didn't begin until 1905, now that an observatory existed to house it. After two years of grinding, plus surviving the 1906 San Francisco earthquake, first light of the world's largest telescope finally occurred in December of 1908. The Cassegrain designed telescope was used for spectroscopy, measuring

parallax, photographing nebulae and photometry. In 1917, Harlow Shapley used the 60-inch to plot distributions of globular clusters, which allowed him to determine the location of the center of the Milky Way. In 1992, it became one of the first telescopes equipped with adaptive optics, increasing the resolving power from 0.5 arc seconds to 0.07 arc seconds. Today, the telescope, using custom made 4" eyepieces, is the largest used for public outreach. If you happen to

have \$1700 waiting to be spent, you, and up to 24 of your friends, can book the scope for an entire night.

Hale, with a classic case of aperture fever, didn't wait long after the 60-inch telescope was begun before he started making plans for an even larger telescope. With funding from John D. Hooker, the blank for a 100-inch mirror started the casting process in 1906. Made

of more than 2 tons of glass, after melting it into one piece, it took over a year to slowly cool without any cracks forming. In November of 1917, the 100-inch Hooker Telescope saw first light. Two years later, with the direction of the observatory clearly moving to areas beyond the Sun, "Solar" was dropped from the name of Mount Wilson Observatory.

*(Continued on page 5)*

## NASA SPACE PLACE

**Where the Heavenliest of Showers Come From****By Dr. Ethan Siegel**

You might think that, so long as Earth can successfully dodge the paths of rogue asteroids and comets that hurtle our way, it's going to be smooth, unimpeded sailing in our annual orbit around the sun. But the meteor showers that illuminate the night sky periodically throughout the year not only put on spectacular shows for us, they're direct evidence that interplanetary space isn't so empty after all!

When comets (or even asteroids) enter the inner Solar System, they heat up, develop tails, and experience much larger tidal forces than they usually experience. Small pieces of the original object—often multiple kilometers in diameter—break off with each pass near the sun, continuing in an almost identical orbit, either slightly ahead of or behind the object's main nucleus. While both the dust and ion tails are blown well off of the main orbit, the small pieces that break off are stretched, over time, into a diffuse ellipse following the same orbit as the comet or asteroid it arose from. And each time the Earth crosses the path

of that orbit, the potential for a meteor shower is there, even after the parent comet or asteroid is completely gone!

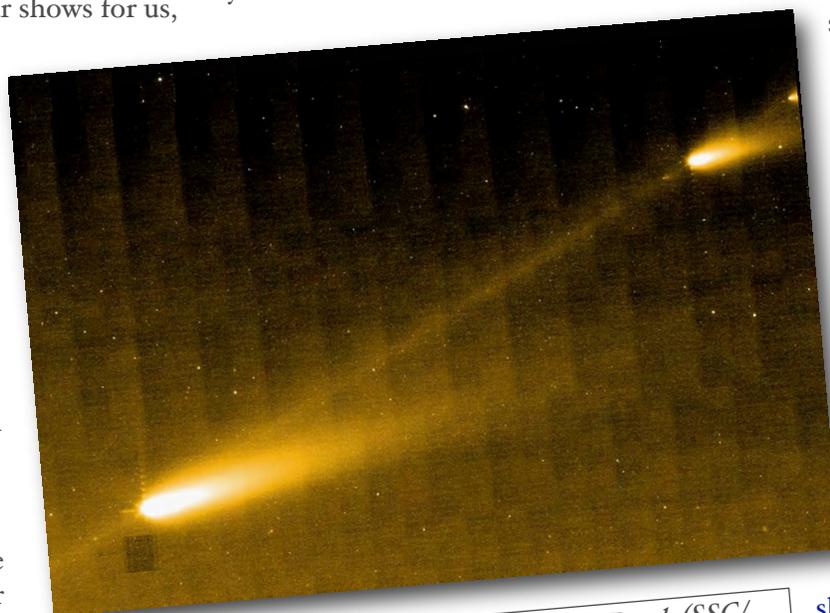
This relationship was first uncovered by the British astronomer John Couch Adams, who found that the Leonid dust trail must have an orbital period of 33.25 years, and that the contemporaneously discovered comet Tempel-Tuttle shared its orbit. The most famous meteor showers in the night sky all have parent bodies identified with them, including the Lyrids (comet

meteors per hour up to more than 100 per hour at their peak today! Your best bet to catch the most is the night of December 13th, when they ought to be at maximum, before the Moon rises at about midnight.

The cometary (or asteroidal) dust density is always greatest around the parent body itself, so whenever it enters the inner Solar System and the Earth passes near to it, there's a chance for a meteor storm, where observers at dark sky sites might see thousands of meteors an hour! The Leonids are well known for this,

having presented spectacular shows in 1833, 1866, 1966 and a longer-period storm in the years 1998-2002. No meteor storms are anticipated for the immediate future, but the heavenliest of showers will continue to delight skywatchers for all the foreseeable years to come!

What's the best way to see a meteor shower? Check out this article to find out: <http://www.nasa.gov/jpl/asteroids/best-meteor-showers>. Kids can learn all about meteor showers at NASA's Space Place: <http://spaceplace.nasa.gov/meteor-shower>.



*Image credit: NASA / JPL-Caltech / W. Reach (SSC/Caltech), of Comet 73P/Schwassman-Wachmann 3, via NASA's Spitzer Space Telescope, 2006.*

Thatcher), the Perseids (comet Swift-Tuttle), and what promises to be the best meteor shower of 2014: the Geminids (asteroid 3200 Phaethon). With an orbit of only 1.4 years, the Geminids have increased in strength since they first appeared in the mid-1800s, from only 10-to-20

*This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.*

## MISCELLANEOUS

**Reflections***(continued from page 1)*

I know that there are many factors, but one of those factors is based on the comments that visitors tell me when I talk to them at the meetings. I was really surprised at the number of people that tell me that they came to the park the day we were there with Astronomy Day and thought how interesting the displays and information we had to offer. Let's keep the momentum going.

I wanted talk a little about "Space Week" which aired on the science channel in November. I hope you got to watch some or all of the shows. If you did, you know what I am talking about.

The big show I wanted to talk about was the landing of the "Rosetta/ Philae" spacecraft on the comet 67P/Churyumov-Gerasimenko Wednesday night, November 12. I have said before and I feel that it bears repeating again. In the future, landing on a comet may be like going to the moon. However, for now this is a major breakthrough for astronomy now and in the near future. It will take years to study the data and it will be the next or even the generation after to fully understand what we have learned from this major event. I think that Mr. Armstrong's comment when he set foot on the moon is perfect for this event as well. I would change it just a little to say "One ordinary landing for man, one giant landing for all of mankind." I am old enough to recall the landing on the moon. I sat in front of our console color TV that only got a total of three

channels on a good night. I recall sitting on the edge of the seat thinking this must be a fake show. The news person kept talking and I just wanted him to shut up so I could hear what the men were saying. I felt that same feeling watching this landing. Some have said that this is astronomy's golden years. But even as this is a major event I have to think that the golden years have not come yet. What do you think?

Before I close out this month, I wanted to share that our keynote speaker for December with you. We will be welcoming Christi Whitworth, director of education at PARI presenting "Radio Astronomy & Smiley as an Outreach Tool." Our meeting will be on December 5 at 7 p.m. in the Discovery Theater class room. Hope you can come and help us welcome Ms. Whitworth.

Until next time, clear skies!

**Happy Birthday***(continued from page 3)*

Probably the most famous work conducted with the Hooker Telescope was in the 1920's by Edwin Hubble. Using this instrument, Hubble proved that galaxies exist beyond the Milky Way, and discovered that the universe is expanding. It wasn't until the construction of the 200-inch Hale Telescope at Mount Palomar in 1948 that a larger telescope was built, ending the Hooker's reign as world's largest.

For the same reason that L.A. has a constant layer of smog, the inversion layer over Mount Wilson

**Regular Contributors****WILLIAM TROXEL**

William is the current chair of the club.

**TERRY ALFORD**

Terry is a founding member since 1980 and has been chair many times. He has worked as an astronomy lab instructor at ETSU since 2001.

**ROBIN BYRNE**

Robin has been writing the science history column since 1992 and was chair in 1997. She is an Associate Professor of Astronomy & Physics at Northeast State Community College (NSCC).

**ADAM THANZ**

Adam has been the Editor for all but a number of months since 1992. He is the Planetarium Director at Bays Mountain Park as well as an astronomy adjunct for NSCC.

makes the air incredibly steady. The steady skies make this location ideal for interferometry. Interferometry involves observing the same object from two or more locations and combining the light into a single image with a much higher resolution than you can get with a single observation. It was in 1919 that Albert Michelson equipped the 100-

inch with an optical interferometer. Using this device, he was able to measure the angular diameters of closer stars, including Betelgeuse. Michelson was also able to use the telescope to measure the speed of light. In 1988, interferometry at Mount Wilson took a big leap forward with the Infrared Spatial Interferometer, which is comprised of three 1.7 meter movable infrared telescopes. At their widest spacing of 70 meters, the interferometer can achieve a resolution of 0.003 arc seconds. In 1999, Georgia State University's Center for High Angular Resolution Astronomy (CHARA) interferometer saw first light. Using six 1-meter telescopes with a maximum separation of 330 meters, this array has a resolution of 0.0005 arc seconds.

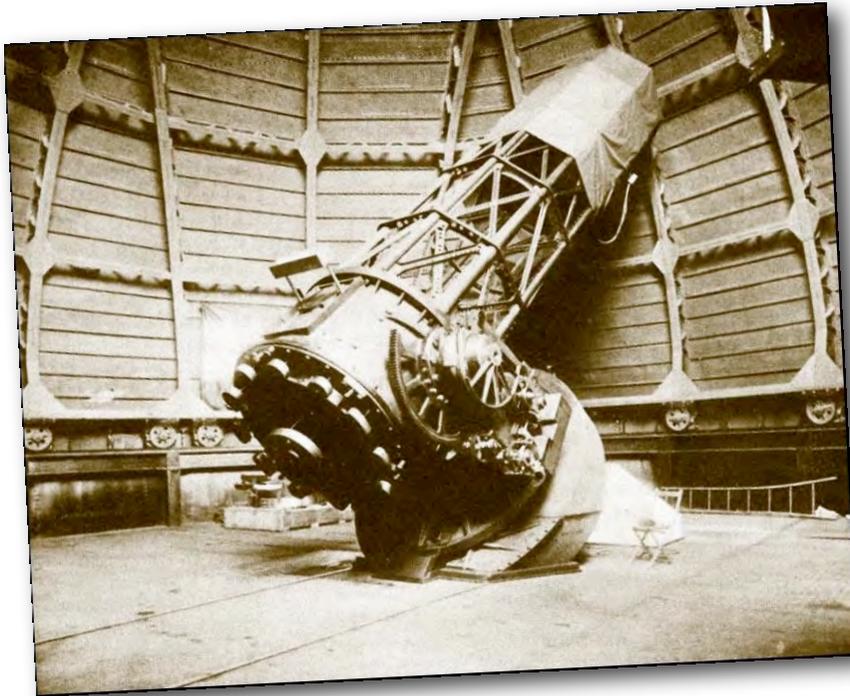
Over the years, various infrared telescopes have been added to Mount Wilson, including a 24-inch telescope, which, in 1966, was the first to directly image the center of the Milky Way. The first infrared survey of the sky was conducted in 1965 using a 60-inch telescope at Mount Wilson. In 1968, a 62-inch telescope was used to create the first large-area near infrared sky survey.

Light pollution from Los Angeles ultimately made Mount Wilson unusable for research of deep sky objects. In 1986, the facility was taken over by the Mount Wilson

Institute, a non-profit organization. The telescopes are still being used for both research and public outreach.

It is sad to think that an observatory that had been responsible for some of the most remarkable discoveries of the 20th century, is now, largely, unusable due to light pollution. However, we can take hope from the fact that some research is still conducted, thanks in

History of Mount Wilson Observatory  
<http://www.mtwilson.edu/his.php>  
 Mount Wilson's First Century  
<http://www.mtwilson.edu/cent.php>  
 Mount Wilson Observatory - Wikipedia  
[http://en.wikipedia.org/wiki/Mount\\_Wilson\\_Observatory](http://en.wikipedia.org/wiki/Mount_Wilson_Observatory)



*Mt. Wilson Observatory  
60 inch Reflector*

large part to the development of adaptive optics and interferometry. And with public access still an important part of Mount Wilson Observatory's mission, who knows how many budding astronomers will be inspired by a visit to this historic institution. George Ellery Hale would be pleased by that thought.

References:



*Little Lessons for Lina  
- StarFest 2014 -  
Photo by Brandon Stroupe*

# The Bays Mountain Astronomy Club



Edited by Adam Thanz:  
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## Dues:

The Bays Mountain Astronomy Club requires annual dues for membership. It covers 12 months and is renewable at any time.

## Rates:

\$16 /person/year

\$6 /additional family member

If you are a Park Association member, a 50% reduction in fees is applied.

Find out more at our website:

<http://www.baysmountain.com/astronomy/astronomy-club/>

🍏 Made on a Mac!

## Calendar

### Special Events

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