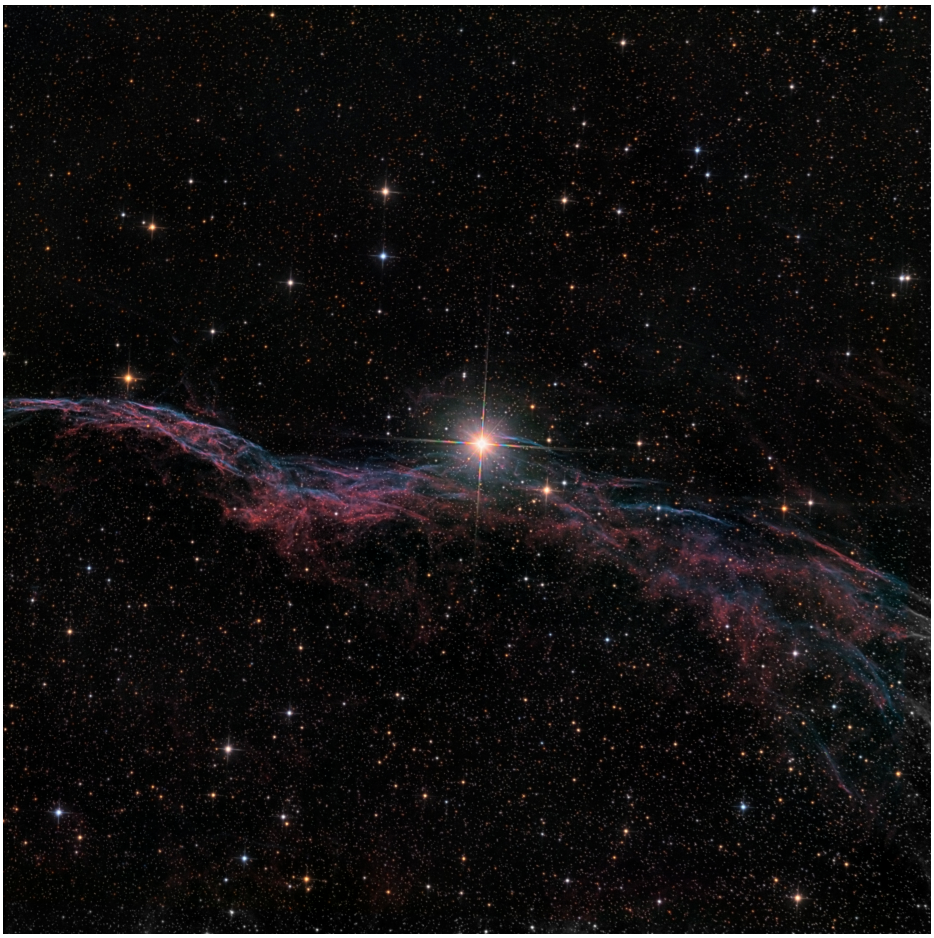
SkyWAAtch



Veil Nebula

Olivier Prache took this image of the Western Veil Nebula in Cygnus over several nights between June 5th and June 18th. The total exposure was 12.5 hours (Blue: 15x10 mins, Green: 6x10 mins, red: 14x10 mins, Lum: 40x10 mins). He used a Hyperion 12.5" astrograph and an ML-16803 camera. Processing was done with PixInsight.

Notes Olivier: Having 52 Cygni, that mimics a star, rise above deep space mist with the Milky Way's stars as a backdrop makes for a fascinating image.

In This Issue . . .

Events for September 2013

WAA September Lecture

"Member Presentations Night"
Friday September 6th, 7:30pm
Lienhard Lecture Hall, Pace University
Pleasantville, NY

WAA members will showcase their astrophotos, equipment and astronomical insights. Those wishing to present should contact the WAA Speakers Coordinator. Free and open to the public. Directions and Map.

Upcoming Lectures

Lienhard Lecture Hall,
Pace University Pleasantville, NY

On October 4th, documentary filmmaker David Gaynes will present on his film *Saving Hubble* and the grassroots effort that helped prevent the early demise of the space telescope. On November 1st, science reporter Andy Poniros will present on his personal experiences as a science reporter covering Space Shuttle Missions STS-134, STS135 and other Shuttle related topics for WPKN fm Radio. Lectures are free and open to the public.

Starway to Heaven

Saturday September 7th, Dusk
Meadow Picnic Area,
Ward Pound Ridge Reservation,
Cross River, NY

This is our scheduled Starway to Heaven observing date for September, weather permitting. Free and open to the public. The scheduled rain/cloud date is September 28th. Participants and guests should read and abide by our General Observing Guidelines and Disclaimer. Directions.

Call: 1-877-456-5778 (toll free) for announcements, weather cancellations, or questions. Also, don't forget to periodically visit the WAA website.

WAA APPAREL

Charlie Gibson will be bringing WAA apparel for sale to WAA meetings. Items include:

- **Caps and Tee Shirts, $10**
- **Short Sleeve Polos, $12**

New Members. . .

Benjamin Juergens - Mount Kisco

Renewing Members. . .

Robie Burke - Brewster
Michael & Ann Cefola - Scarsdale
Joe Geller - Hartsdale
Patricia Mahon - Yonkers
Anthony Monaco - Bronx
John Paladini - Mahopac
Ihor Szkolar - White Plains
William Forsyth - Hartsdale
Andrea Anthony - Yorktown Heights
Leandro Bento - Yonkers
Eric and Katherine Baumgartner - Redding
The Cerbone Family - Tarrytown

Kopernik AstroFest 2013

This event will be held at the Kopernik Observatory & Science Education Center – Vestal, NY from October 4th through 6th, 2013. Presented by the The Kopernik Astronomical Society, the Kopernik Observatory & Science Center and the Night Sky Network; the Astrofest will feature astronomy workshops, solar viewing, observatory tours and speakers from the amateur and professional communities as well as observing at night. Dry camping is available on-site for a nominal fee. To register and for more information go to the Astrofest website.

(Note this event is not affiliated with the WAA).

Westchester
Amateur Astronomers

Almanac

For September 2013 by Bob Kelly

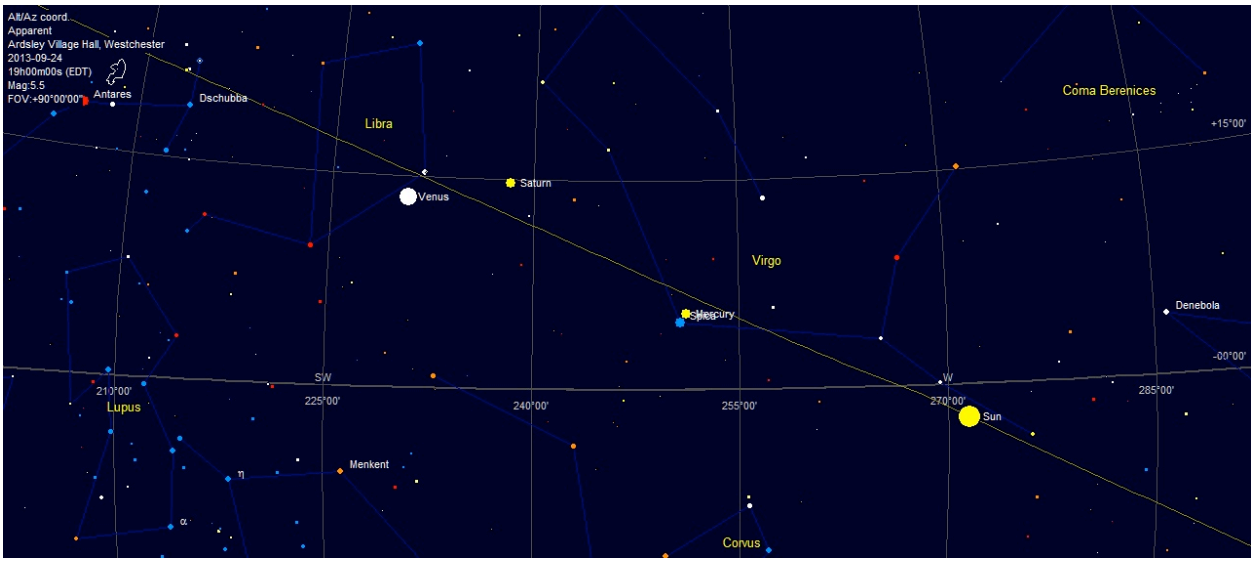
Sept 5 Sept 12 Sept 19 Sept 26

September's a swell month for increasing the magnification of our Solar System's residents. Jupiter, Venus and Mars swell to larger sizes and Comet ISON might get in range of our Club's larger telescopes. Even a star in our Milky Way swelled up so much it got a new name: Nova Delphinus 2013.

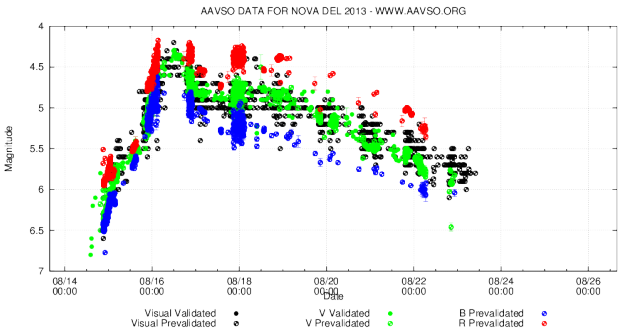
Venus is magnitude -4.1 and still stunning after sunset, if the trees don't get in the way. Our sister-planet-from-hell swells to 18 arc seconds wide as it's the planet closest to Earth this month. Telescopes show a bit more than a half-lit Venus. It'll be interesting to see what views daytime ultraviolet observers get of Venus' cloud top patterns that hide the sulfuric acid rain and 800 degree plus temperatures below. It will be hard to find Venus in the daytime, since it doesn't get higher than the Sun in the sky until 4pm daylight time.

Mercury slips over to the evening side of the Sun, but is even lower in the sky than Venus. They are easier to see from Earth's Southern Hemisphere. Both Venus and Mercury appear to move southward parallel to the horizon during this month. Saturn dives more directly to the horizon. Saturn will still be a fun object at our Starways in September and October, but it's getting low for sharp viewing.

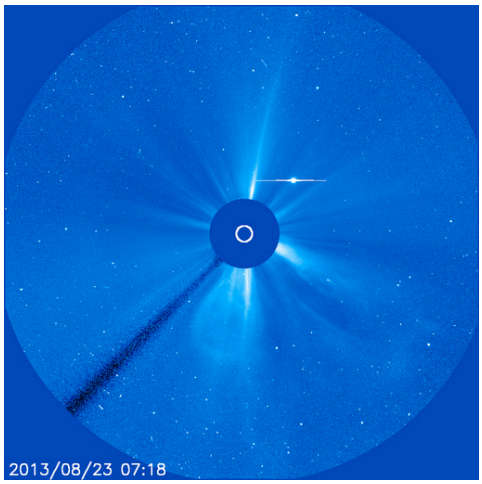
Once it gets dark, the Milky Way bisects the sky, with our guest star, Nova Delphinus 2013 overhead. Even with the constellation Sagitta (the Arrow!) pointing in its direction to help me find it, above the dolphin (Delphinus), I couldn't tell which star was the nova (I get lost a lot in the Milky Way- so many stars, so little time to get to know them all!). Nova Del (as his friends call him) peaked about 5th magnitude and was settling down just above magnitude 6 as of late August.



Western horizon, 7pm Sept 24th. Notice Mercury right next to 1st magnitude Spica and how Venus, Saturn and Mercury are not very far above the horizon – the horizontal line - even though the Sun is just below the horizon. Map from Cartes du Ciel.



So, come to our Starway to Heaven events (yes, the name drives Microsoft's spell checker nuts!), where you can always borrow views through our telescopes. But with the Internet, you can use some unlikely telescopes to see what you can't see from our ground-based scopes. Mercury just completed a pass behind the Sun, visible as that bright dot in the SOHO C3

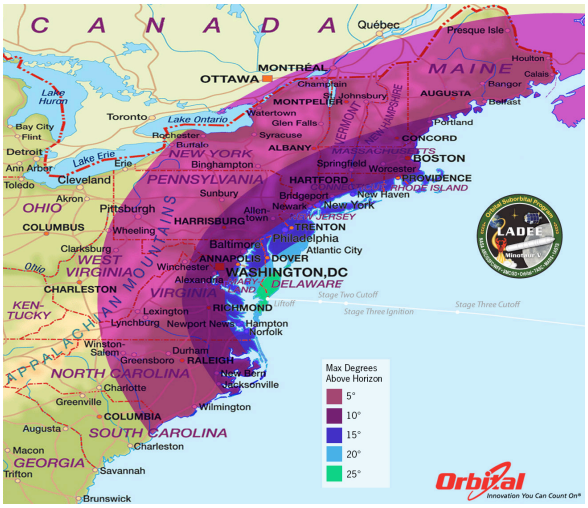


scope. Other dots include stars, perhaps an asteroid or two; and if you look carefully at the 4 o'clock position in this example, a small comet is making a one-way trip to evaporate in the Sun's atmosphere. The short lines are cosmic-ray hits on the detector and the haze is from solar eruptions.)

Curiosity, the latest Mars rover, snapped a shot of a Martian moon, Phobos, crossing the Sun, while using other cameras to photograph the change in brightness on the ground caused by this Phobean partial eclipse of the Sun. Go to the Planetary Society's blog and scroll to A special Phobos eclipse to see the action.

If all goes well, on September 6th at 11:27pm, the Wallops Island spaceport on the DEMARVA peninsula will launch LADEE, a probe to sample the incredibly thin atmosphere of our moon and we'll be able, if no clouds get in our way, to see parts of its powered flight. When have you seen, with your own eyes, a spacecraft launching to the Moon? (You lucky. Apollo launch veterans put your hands down, now.)

As Comet ISON heads into the inner solar system, it will appear near Mars in our morning skies during late September. This is a wonderful situation where the comet will not just be lined up with Mars from our



LADEE launch visibility map

point of view, but will actually be passing over Mars' north pole on October 1st. C/2012 S1 ISON's pass, about 6 million miles away from Mars, will be bested by Comet C/2013 A1 (Sidding Spring) when it passes about 80,000 miles from Mars on October 19th, 2014. A number of our Martian satellites and rovers will become astronomers, tasked with getting data to help us learn more about how these comets evolve as they get closer to our Sun. It's hard to tell how bright ISON is or will be, since the Sun has been blocking our observations until recently, but it is likely to be on the fainter side of 12th magnitude this month.

The Moon starts and ends the month between Jupiter and Mars in the morning sky. On the 8th, it will pass almost over Venus – a great scene that binoculars make spectacular. Will one of our planetary photogs get a view of crescent Moon and half-lit Venus together?

SOHO: http://sohowww.nascom.nasa.gov/data/realtime-images.html

Phobos eclipse: http://www.planetary.org/blogs/emily-lakdawalla/2013/08201724-a-special-phobos-eclipse.html

LADEE: http://www.planetary.org/blogs/emily-lakdawalla/2013/08221649-ladee-prepares-for-launch.html

http://science.nasa.gov/missions/ladee/

http://www.orbital.com/NewsInfo/MissionUpdates/MinotaurV/index.shtml

Articles and Photos

Two Monuments to Discovery

by Larry Faltz

The actual process of science has been a subject of philosophical debate ever since science itself emerged as a proper human endeavor. We theorize, then we confirm. The philosopher Karl Popper (1902-1994) is generally credited with defining the modern criteria for proof in science by stressing the concept of "falsifiability". In an article published in 1963, he listed the characteristics of what constitutes proof:

1. *It is easy to obtain confirmations, or verifications, for nearly every theory — if we look for confirmations.*
2. *Confirmations should count only if they are the result of risky predictions; that is to say, if, unenlightened by the theory in question, we should have expected an event which was incompatible with the theory — an event which would have refuted the theory.*
3. *Every "good" scientific theory is a prohibition: it forbids certain things to happen. The more a theory forbids, the better it is.*
4. *A theory which is not refutable by any conceivable event is non-scientific. Irrefutability is not a virtue of a theory (as people often think) but a vice.*
5. *Every genuine test of a theory is an attempt to falsify it, or to refute it. Testability is falsifiability; but there are degrees of testability: some theories are more testable, more exposed to refutation, than others; they take, as it were, greater risks.*
6. *Confirming evidence should not count except when it is the result of a genuine test of the theory; and this means that it can be presented as a serious but unsuccessful attempt to falsify the theory. (I now speak in such cases of "corroborating evidence.")*
7. *Some genuinely testable theories, when found to be false, are still upheld by their admirers — for example by introducing ad hoc some auxiliary assumption, or by reinterpreting the theory ad hoc in such a way that it escapes refutation. Such a procedure is always possible, but it rescues the theory from refutation only at the price of destroying, or at least lowering, its*

> *scientific status. (I later described such a rescuing operation as a "conventionalist twist" or a "conventionalist stratagem.")*

One can sum up all this by saying that the criterion of the scientific status of a theory is its falsifiability, or refutability, or testability.

Another noted philosopher of science, Thomas Kuhn, defined "normal science" as "research firmly based upon one or more past scientific achievements, achievements that some particular scientific community acknowledges for a time as supply the foundation for its further practice." (Kuhn, *The Structure of Scientific Revolutions*, 1962). Kuhn goes on to describe "paradigm shifts", when great scientific thinkers break from what the "scientific community" has established as its foundation, through some insight or serendipitous discovery that previous orthodoxy can't manage. We know of many examples: Galileo, Newton, Planck, Einstein, Bohr.

Falsifiability is hard in observational astronomy. While biomedical research relies almost exclusively on comparisons with "controls" (results from a multicenter double-blind placebo-controlled study being the epitome of clinical truth) it's much harder for astronomers to design their experiments to permit contemporaneous comparisons. Extrapolations and models are generally required, and these are often subject to hidden variation and bias. Confirmation is a more common method in astronomy and physics, and as Popper notes, it's not the optimal strategy.

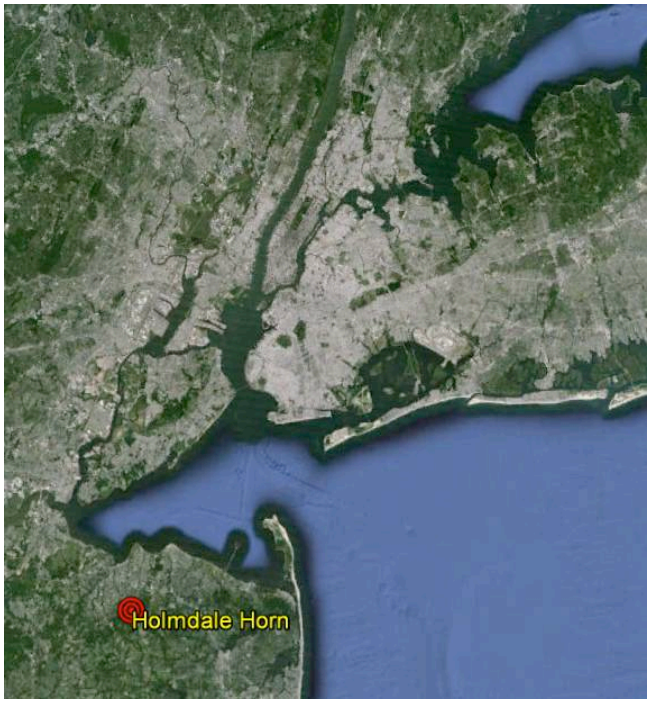
And what of serendipity? The march of science has sometimes depended mightily on completely unexpected observations, where the observation itself preceded the theory. Galileo's telescope, Newton's apple, Fleming's mold and Becquerel's film are just the most obvious examples.

In August, Elyse and I decided to take a field trip to something that should be considered a true monument to serendipity. It's also, in my opinion, one of the three great monuments to cosmology. The Holmdale Horn, so called, is the antenna that Arno Penzias and Robert Wilson used to discover the 2.7° K cosmic microwave background radiation, generally considered to be "proof" of the Big Bang theory of the origin of the universe. I've seen one of the other two monuments, the spectroscope that Vesto Slipher used at Lowell Observatory to measure the galactic red shifts in 1912, but I haven't yet seen the 100 inch Hooker telescope at Mt. Wilson that Edwin Hubble used to discover the expansion of the universe, work he published in 1929. I actually came upon Mt. Wilson serendipitously while driving the Angeles Crest Highway in the San Gabriel Mountains late one afternoon in 2005, but it was closed.

The Holmdel Horn was built by Bell Laboratories, the research and advanced technology arm of AT&T until its break-up in 1984, when it became a part of Lucent Technologies. Since then, it's been pared down, bought out (it's now part of Alcatel-Lucent, a French company) and essentially stripped of basic science research. Bell Labs is responsible for an amazing number of world-changing technology breakthroughs, among them the transistor, the laser, the UNIX operating system, the C++ programming language, cellular communications and charge-coupled devices (CCD's).

As the research arm of the world's leading telecommunications company, Bell Labs would naturally have been at the cutting-edge of new technologies, and space-based communications was no exception. The first communication satellite, Echo 1, was launched on May 13, 1960, followed by Echo 2 in 1964. The Echoes were large (100- and 135-feet in diameter respectively) mylar balls (not built by Bell Labs) that passively reflected microwave signals, bouncing them from one location to another as they flew in low earth orbit. Bell Labs designed and built a reflecting horn antenna, known as a Hogg antenna, to receive microwave signals from Echo. The horn antenna has many advantages for microwave communications, particularly directionality and broad wavelength range. The utility of Echo waned with the launch of an active transmission/retransmission satellite, Telstar, in 1962. Telstar was built by Bell Labs and had an even broader wavelength range, including handling video signals. Since different transmitter and receiver equipment was needed, the horn antenna was mothballed. It had a greater destiny than pinging phone calls off a balloon.

The antenna was built by Bell Labs engineer Arthur B. Crawford on one of the company's properties in the town of Holmdale, NJ, just west of the Garden State Parkway. Bell Labs had many research and development facilities in New Jersey (and is still headquartered in Murray Hill). The site is known as Telegraph Hill. It's not far from exit 116 of the Garden State Parkway, just off Holmdel Road. The antenna, along with some other small structures and abandoned communications antennae, is on a field east of an Alcatel-Lucent building, up a small hill. The edges of the field are forested, but photos of the horn from the 1960's show trees at lower height and density.



Arno Penzias, German-born but US-educated, was recruited to Bell Labs in 1961 to work on microwave communications. Texan Robert Wilson, trained in radio astronomy, joined him in 1963. When the satellite communications project was discontinued, the two were granted permission to use the Holmdel Horn to search for radio emissions from molecules in deep space. Although the horn itself was fairly simple, their receiving equipment was quite sophisticated, utilizing liquid helium cooling to eliminate thermal emissions in the receiver. It's wonderful to think that a corporate entity would be so enlightened as to support such basic research.

Wilson (L) and Penzias (R) at the Horn, unknown date.

The story of their discovery is well known. They encountered a low-level hiss in their signal that came from every direction, even at wavelengths where they expected no radiation. They cleaned the horn of bird droppings and they verified that interference from NYC wasn't a factor (the direct Horn-to-Times Square distance is only 27 miles). They tried everything they could to eliminate the hiss, but they couldn't do it. "Genius is nothing but a greater aptitude for patience." (Buffon) They ended up with a spectrum that appeared to be that of a black body radiating at 3.5±1.0 K (the current value is 2.72548±0.00057 K).

At the time, there were two competing theories of the universe, both with roots in Einstein's General Theory of Relativity. Einstein, believing that the universe was static and eternal, had put in the infamous (now famous) cosmological constant to balance what would otherwise be unopposed gravitational contraction that would pull all matter together. In the 1920's Russian Alexander Friedmann and Belgian Georges LeMaitre both solved Einstein's equations for the case of an expanding universe. LeMaitre reasoned that universal expansion would have had to start from a point of infinite density. Shortly thereafter, Hubble showed that the universe was indeed expanding. Einstein withdrew the cosmological constant, but he still had trouble believing that the universe started at a finite moment.

There were others who shared this view, and a rival "steady state" theory was proposed by James Jeans in the 1920's and then revised and strengthened by respected astronomer Fred Hoyle and his associates Thomas Gold and Herman Bondi in 1948. Hoyle argued that the expansion, an accepted scientific fact, was accompanied by the creation of new matter in deep space between galaxies at a rate that would maintain the universe's mass density and eternally infinite extent. Hoyle proposed a "C (creation) field" which had negative pressure in order to maintain the conservation of energy. Hoyle, by the way, gets credit for coining the term "Big Bang" during a radio broadcast in 1949. He didn't like the concept, but he was clever enough to name it in a way that everyone could picture it. One of Hoyle's motivations for eschewing a moment of creation was said to be his strong anti-religious views. Moments of creation are often tied in the public's mind to the influence of deities, and that bothered him.

When I first started learning about astronomy in the late 1950's, the two theories were generally viewed as balanced rivals of equal claim to validity. George Gamow, who with Ralph Alpher and Hans Bethe had written a seminal 1948 paper on nucleosynthesis in the early universe, was a proponent of the Big Bang

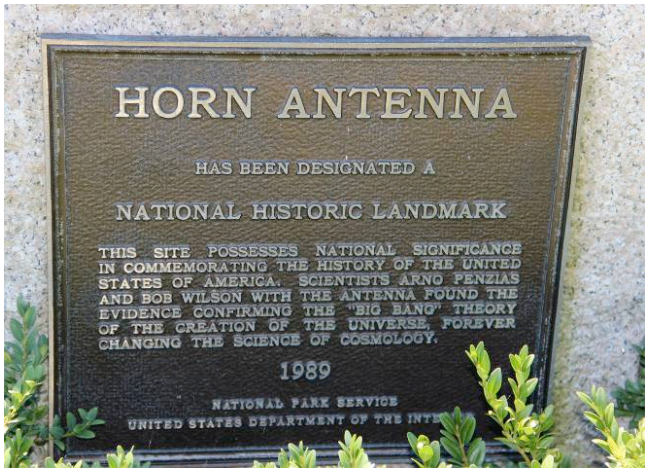
theory. He assumed that there was a great deal of radiation in the early universe that would be cooled by expansion, and estimated in the late 1930's that the residual temperature would be 50° K. Other cosmologists made estimates in similar ranges, all in error by at least an order of magnitude because the accepted value of the Hubble constant at that time was too low, the universe then thought to be only 10 billion years old. Shortly after the publication of the Alpher, Bethe, Gamow paper, Alpher and Robert Herman published an analysis which calculated the residual radiation temperature to be just 5° K.

A group at Princeton under the direction of RH Dicke was researching the problem in the late 1950's and planned to build an antenna to search for the radiation. Penzias and Wilson, who found the signal but had no idea of its origin, were put in touch with Dicke's group through the mediation of Bernard F. Burke, an MIT physicist. When the Princeton and Holmdel groups met, they realized that they had solved each others' problems. A pair of short papers appeared in *Astrophysical Journal Letters* in July 1965 announcing the findings, first Dicke's theoretical treatment (with Peebles, Roll and Wilkinson) and then Penzias and Wilson's observational findings, each paper acknowledging the other. The steady state theory had no satisfactory explanation for the radiation, and per Popper's criteria it was falsified and defeated.

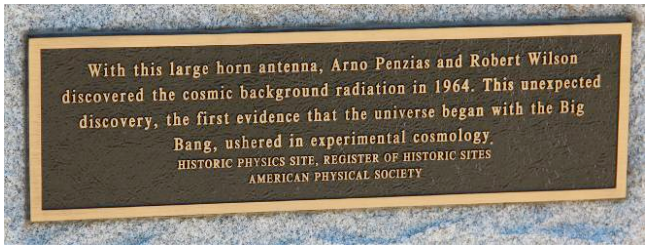
Inside the horn.

The Horn itself has been cleaned, but it's clearly in mothballs. The mounting is alt-azimuth, with the whole apparatus rotating in azimuth on a large turntable, and the altitude mechanism is set up as a yoke. The horn is tilted downwards, to prevent people or animals from climbing in.

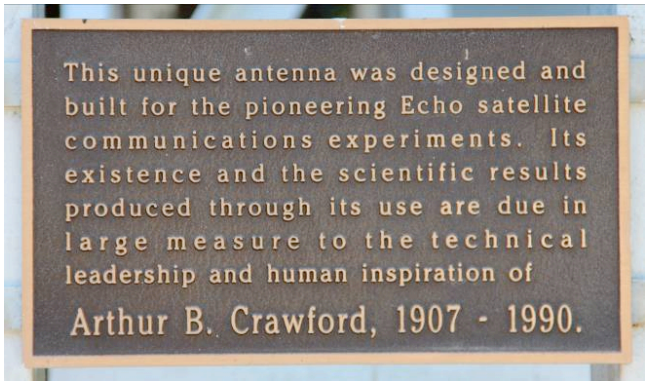
There were several plaques. The National Historic Landmark Plaque was mounted on a stele, surrounded by some plants.



A plaque was erected by the American Physical Society on another stele.



Bell Labs placed a plaque on the device itself honoring Crawford after his death.



When we drove onto the site, the sign to the antenna said "Escorted Only", so we dutifully stopped at the Alcatel-Lucent building. A couple of staff members were there and told us we could go up ourselves, but then one of them engaged us in conversation and told us an interesting tidbit. "You know," he said, "the horn is still in operation." "I didn't think it was," I answered. "Well, not for radio astronomy, but we've used it when we have staff picnics up there. You see, the horn works as an excellent amplifier. We put a 4-

watt speaker at the base of the horn, and turn it towards the picnic tables, and the sound is BLASTING. But it's really focused and so it only has a width of about 4 feet. You're walking along, hearing almost nothing, and then you walk into the beam and BOOM!" Apparently this was a highlight of Arno Penzias' retirement picnic in 1998. He also told us that when Holmdel High School, ¾ of a mile away, was being built, people at the Horn could listen in to conversations among the workers and even surprise them with comments. The words would come out of nowhere because of the highly focused acoustic beam. This kind of acoustic focusing reminded me of the similar effect in the "Whispering Gallery" in St. Paul's Cathedral in London.

Transistor-shaped water tower (LF)

The staff member also told us about another important monument to astronomical serendipity and discovery a few miles away at the former Bell Labs research and development headquarters. To find it, he told us to look for a water tower shaped like a transistor. It wasn't hard to find. Just 1.8 miles southeast of the Horn, as we were driving past cornfields on Crawford's Corner Road, Elyse spotted the structure, a clam-shaped reservoir on top of three spindly legs about 90 feet in height. Along the road was a sign announcing the importance of the site.

We pulled into the long driveway, which headed past an immense lawn towards a large rectangular building sheathed in glass that was set back more than half a mile from the road. The driveways were cracked and weeds had grown up, attesting that the place had been abandoned for some time, but perhaps not totally: someone had been mowing the lawns. We headed towards the building. Past a small lake and a flock of Canada geese there was a sign with directions for the facility ("Receiving", "Visitors" and the like), one entry of which was "Jansky Monument." We followed the road around until we came to the monument, a 12-foot long pair of square waves made of stainless steel on a small, bare berm from which roots were sticking out. The site had obviously been gardened at one time, but there was no evidence of care now.

Sign on Crawford's Mill Road. (LF)

Google Earth view of the former Bell Labs R&D complex

The Jansky Monument on August 5, 2013 (LF)

A plaque next to the monument had faded badly from the sun, looking like a negative of itself. It had a picture of Jansky, a photo of his antenna, and text which read:

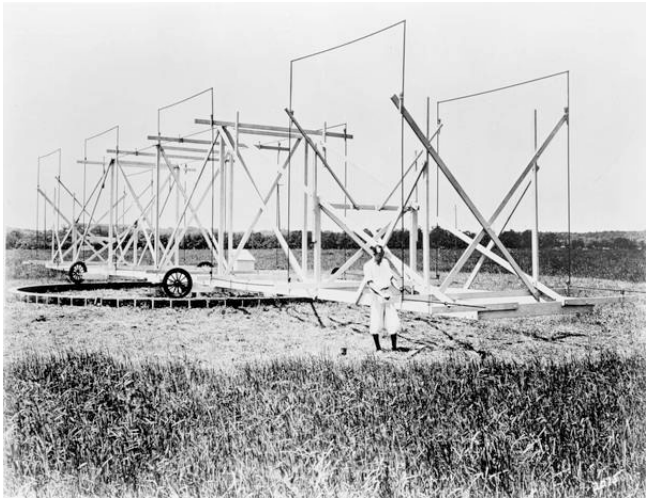
At this location in 1931, Karl Jansky, a Bell Laboratories physicist and radio researcher, recorded for the first time radio signals from beyond the Earth. The source of these signals—radio noise at a wavelength of 14.6 meters—was the center of our Milky Way galaxy.

The sculpture commemorates Jansky's discovery, first announced in 1933, which gave birth to the science of radio astronomy. The sculpture is oriented as Jansky's antenna was at 7:10 pm on September 16, 1932, at a moment of maximum signal. As his directional antenna rotated, the center of our galaxy came in to view in the direction of the constellation Sagittarius, low on the southern horizon.

Radio astronomy pioneer Karl Jansky died in 1950, years before the scientific community realized the significance of his discovery. In 1973, the International Astronomical Union have his name to the international unit of radio flux density. Jansky's work led to a number of breakthroughs in astronomy: the discovery of quasars, pulsars, radio galaxies, and near this site in 1964, the Nobel Prize winning discovery by Bell Laboratories scientists of the cosmic microwave background which has revolutionized our understanding of the universe.

We could not find a sculptor's name on the sign, nor a dedication date, but a search on the web disclosed that the monument was erected in 1998 and there's even a photo of the dedication ceremony.

The waves are a representation of Jansky's highly directional antenna, which he used to study the origin of radio static.



Jansky and his antenna, at the exact spot of the monument.

Jansky found that there was a periodicity and directionality to the static's intensity, that it varied with the sidereal rather than the solar day, and was greatest when the antenna was pointed towards what we now know to be the center of the galaxy. He realized that the signals were from beyond the solar system. He presented the findings at a research symposium in Washington, DC the following year. The NY Times carried a story about the presentation on May 5, 1933. Bell Labs' R&D focus in the 1930s and then in World War II was on telecommunications, and Jansky was unable to do more astronomical research.

Someone involved with the Large Synoptic Survey Telescope set up a web page about the Jansky monument in the face of the impending sale of the empty Bell property. It includes a 2006 petition addressed to then-NJ governor Corzine asking that the monument be saved. The petition was signed by 113 members of the National Academy of Sciences, including some Nobelists (Penzias and Wilson among them). I fear its impact will be minimal. The one caretaker on the property told us the sale was finally going to close in September. There were suggestions about a medical facility or a college for the site.

In addition to saving the monument, I hope the developer will save the Bell Labs headquarters building, because it was one of the last structures designed by the famous architect Eero Saarinen. Its 2 million square feet of massive glass-sided splendor once housed offices and laboratories that produced incredible scientific and technological advances for a forward-looking company that is now sadly a shade of its former self. Work at Bell Labs won 7 Nobel Prizes, and there would have been 8 had Jansky not died prematurely (Nobels are not awarded posthumously). There have been honors for Jansky, though: better late than never. The unit of radio flux is officially called the Jansky. In 2012, the Very Large Array in New Mexico was renamed the Karl G. Jansky Very Large Array, and there's a Jansky crater on the moon. Physical monuments may not survive, but a contribution to science of such profound reach will be eternal. Looking at the forlorn and threatened Jansky Monument, I thought of one of Horace's *Odes* that begins

I have created a monument more lasting than bronze, and loftier than the royal structure of the pyramids, that which neither devouring rain, nor the unrestrained North Wind, may be able to destroy, nor the immeasurable succession of years and the flight of time.

But perhaps even more apt, and circling back to the acoustic properties of the Holmdel Horn and its similarity to the Whispering Gallery at St. Paul's, is the inscription on that magnificent structure honoring its architect, Sir Christopher Wren:

> *Si monumentum requires circumspice.* [If you would see his monument, look around.]

For Jansky, it's look to the skies.

Karl Jansky (1905-1950)

RAC Summer Star Party Recap
by Claudia Parrington

This summer is just about over but Kevin and I were able to enjoy it. We attended Rockland Astronomy Club's Summer Star Party at Peppermint Park Campgrounds in Plainfield, Massachusetts. The SSP is a ten day event that is focused on astronomy. We arrived on Friday, set up our tent and got settled in. Once we registered we received a shirt, a NEAF ticket and a raffle ticket. Not a lot was happening because RAC was also getting settled in and getting things prepared for the ten days. This was a new campground for RAC so everyone was adjusting. People were either in tent sites, RV sites or camped out on the field. Either way, your scope was on the field. People arrived throughout the week including some WAA members: Our editor Tom, the field events coordinator Bob, Dee Dee and Eric and Kathy. Friday was a great viewing night and people that were only there for the weekend took advantage of this. The skies were dark enough that we were able to see the thick band of the Milky Way.

Saturday was a busy day for both the campgrounds and the RAC. The campground had activities such as Bingo and crafting during the day while RAC had a lecture by Rob Teeter and another one by Alan

Alan MacRobert and Claudia

MacRobert from *Sky and Telescope*. There were also vendors there throughout the weekend--Teeter Telescopes and Camera Concepts and Telescope Solutions (CCTS). Jeff and the gang at CCTS were extremely helpful because if you forgot something, instead of having to do without, you were able to purchase it from them. As you may know Teeter is the owner of Teeter telescopes and he also did a talk about his scopes. Alan MacRobert is a senior editor at *Sky & Telescope* magazine and he gave a talk about Comet ISON and night vision techniques. Saturday was also a day for everyone to get to know each other. Since it was light, we were able to see the face of the voice we were hearing the night before.

Saturday evening was another good viewing night. At sunset RAC had some live music and set off sky lanterns. It was a bit windy so not all lanterns had a successful flight but we set them off another night and it worked out much better. In the field were not only astronomers but campers from the campsite. Many of them didn't know what was going on, so RAC had invited them to learn about why we were there. RAC was great about not having white lights so that they covered the camper's flash lights with red cellophane and urged the fact of not using them unless they were covered. The campground was great as well with this because they coved the golf cart lights with the cellophane too. Once it was dark enough to see everything in the sky, Alan MacRobert did a demonstration of what-was-what in the sky. He had his green laser and was pointing to all sorts of constellations which really interested both the astronomers and non-astronomers.

Sunday was the last day for a handful of people but not for us! It was a quiet morning but RAC had a StarBQ for lunch. It was a nice chicken lunch and everyone from the SSP was able to sit and just hang out in the lodge. The weather was not too great that day because it continued to rain on and off all day. After the StarBQ, there was the raffle. The big prize was an eye piece from Al Nagler. With how my luck is, I won a picture, an astronomy book and a gift certificate from CreateACase. There was another person that won a Solar System imaging camera and since he didn't have a scope we traded. I went home with the gift certificate and the camera.

From the start of the SSP, we saw RAC board members managing the event. Jose Alvira was the SSP Team Manager. He was the one in the club tent that was able to help with anything that anyone needed. When not working to erect his dome tent, Ed Siemenn was also assisting SSP participants. Because of all the running around he did, I think he finally had the dome erected half way through the week. Keith Murdock and John seemed to be the ones that were in charge of red lights. They had gone into all of the comfort stations and lodge to put red lights in place of the white lights. We actually didn't see them the first night because they crashed from all the work they had done. Throughout the week we saw other board

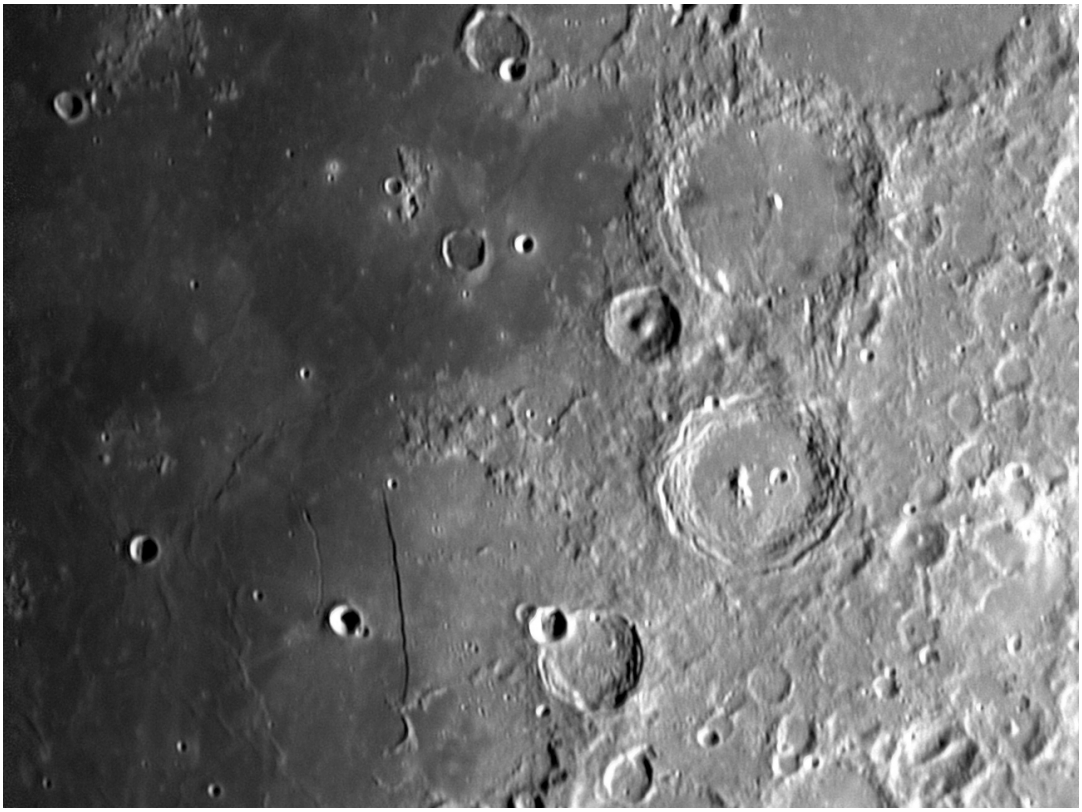
members helping with either the raffle, sound equipment or many miscellaneous activities.

During the week, Kevin and I went to Yankee Candle, Magic Wings, Jiminy Peak, local restaurants and our favorite place, Wal-Mart. For whatever reason, we really enjoy that store and we were there about 4 times. Since it is the closest thing to the campsite (30 minutes), it just made sense. Throughout the week, there were lectures on astronomy. One of our favorite lectures was that by Al Nagler. He had come up on Thursday because he was going to Stellafane that weekend. It was an engaging talk about how eye-pieces work. It wasn't too technical but more understandable for people new to astronomy. Al even signed Kevin's original 13mm Nagler for him. We considered him a celebrity but after the lecture, he just talked with everyone and answered any questions we had. He knew so many people that were at the SSP that he and his wife stuck around for movie night. Another lecture that we enjoyed was one by Tom Picciani. He talked about imaging and how to process CCD camera images with Photoshop. Except for it being difficult to see the screen because of the sunlight, it was an informative lecture.

Kevin, Al Nagler and Claudia

This was not our first SSP, and it will not be our last. Each time we go, we learn something new about astronomy or our scopes. We love it because we are able to set up our scope, cover it and not have to worry about packing it up for ten days. It is also nice and quiet. All you hear at night is the animals: no cars or airplanes going by. We hope next year to see more WAA members there with us!

Rupes Recta
by Larry Faltz



The 8-day waxing gibbous moon is the best time to view the 70-mile long Rupes Recta, the Straight Wall, at the southeast edge of the Mare Nubium. Although it looks like a cliff line, it's really a slope about 900 feet high with a pitch of 30-40 degrees. If it was covered in snow, you could ski it. To the west (left) is the dual crater Birt/Birt A with the rille Rima Birt to its left. To the east of the Straight Wall is the crater Thebit perched on the edge of an older crater, Purbach. The larger craters to the northeast are Arzachael and Alphonsus.

Size Does Matter, But So Does Dark Energy
by Dr. Ethan Siegel

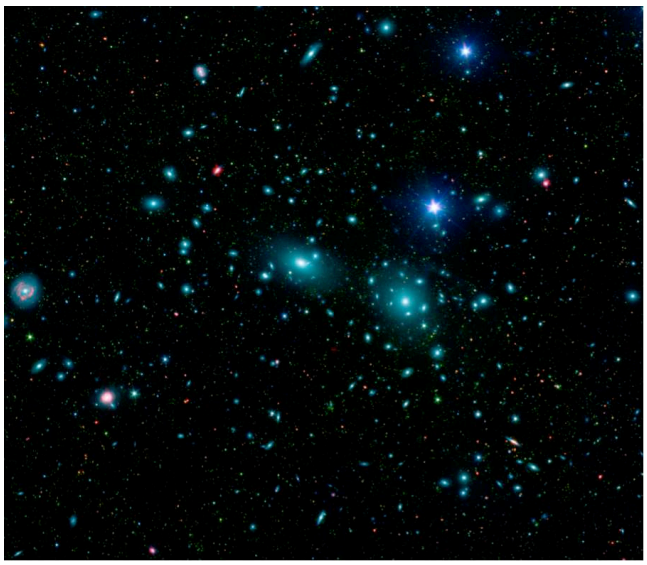
Here in our own galactic backyard, the Milky Way contains some 200-400 billion stars, and that's not even the biggest galaxy in our own local group. Andromeda (M31) is even bigger and more massive than we are, made up of around a trillion stars! When you throw in the Triangulum Galaxy (M33), the Large and Small Magellanic Clouds, and the dozens of dwarf galaxies and hundreds of globular clusters gravitationally bound to us and our nearest neighbors, our local group sure does seem impressive.

Yet that's just chicken feed compared to the largest structures in the universe. Giant clusters and superclusters of galaxies, containing thousands of times the mass of our entire local group, can be found omnidirectionally with telescope surveys. Perhaps the two most famous examples are the nearby Virgo Cluster and the somewhat more distant Coma Supercluster, the latter containing more than 3,000 galaxies. There are millions of giant clusters like this in our observable universe, and the gravitational forces at play are absolutely tremendous: there are literally quadrillions of times the mass of our Sun in these systems.

The largest superclusters line up along filaments, forming a great cosmic web of structure with huge intergalactic voids in between the galaxy-rich regions. These galaxy filaments span anywhere from hundreds of millions of light-years all the way up to more than a billion light years in length. The CfA2 Great Wall, the Sloan Great Wall, and most recently, the Huge-LQG (Large Quasar Group) are the largest known ones, with the Huge-LQG -- a group of at least 73 quasars – apparently stretching nearly 4 billion light years in its longest direction: more than 5% of the observable universe! With more mass than a million Milky Way galaxies in there, this structure is a puzzle for cosmology.

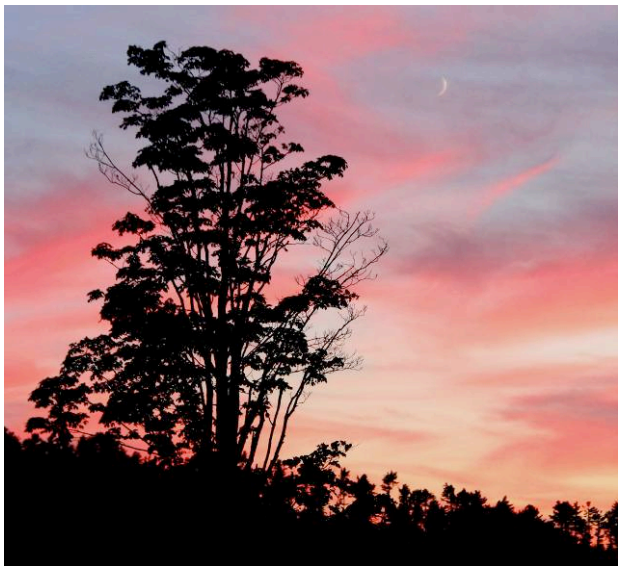
You see, with the normal matter, dark matter, and dark energy in our universe, there's an upper limit to the size of gravitationally bound filaments that should form. The Huge-LQG, if real, is more than double the size of that largest predicted structure, and this could cast doubts on the core principle of cosmology: that on the largest scales, the universe is roughly uniform everywhere. But this might not pose a problem at all, thanks to an unlikely culprit: dark energy. Just as the local group is part of the Virgo Supercluster but recedes from it, and the Leo Cluster -- a large member of the Coma Supercluster -- is accelerating away from Coma, it's conceivable that the Huge-LQG isn't a single, bound structure at all, but will eventually be driven apart by dark energy. Either way, we're just a tiny drop in the vast cosmic ocean, on the outskirts of its rich, yet barely fathomable depths.

Learn about the many ways in which NASA strives to uncover the mysteries of the universe: http://science.nasa.gov/astrophysics/. Kids can make their own clusters of galaxies by checking out The Space Place's fun galactic mobile activity: http://spaceplace.nasa.gov/galactic-mobile/



Digital mosaic of infrared light (courtesy of Spitzer) and visible light (SDSS) of the Coma Cluster, the largest member of the Coma Supercluster. Image credit: NASA / JPL-Caltech / Goddard Space Flight Center / Sloan Digital Sky Survey.

August 10th Star Party Report



At least 15 telescopes were deployed at Ward Pound for the August star party. Some thin clouds created some viewing frustrations, but pre-paid for them with a gorgeous sunset. After dark, brighter deep sky objects were visible through the gauze, and there were ample spaces in between to glimpse them properly. The clouds got thinner as the evening progressed, and those of us who stayed late were rewarded with dark, crystal clear skies starting just before midnight, with the Milky Way easily visible and the Sky Quality Meter measuring 20.44 at about 12:45 am, about as dark as it gets at Ward Pound this time of year. There were some Perseids throughout the evening to the delight of everyone, and even more for the few stalwarts who stayed until the wee hours. Here are some pictures taken during set-up.

Steve (& Sharon, not pictured) Gould, Celestron 90mm Mak and Celestron 6" Nexstar SCT

Doug Towers, Meade 90mm refractor. In the back, Tom Boustead and park ranger Pat.

Karen Seiter, Meade LX-90. Best license plate in the club.

Newcomers Lisa and Leo, Meade LX-90

Al Ferrari, Meade LX-200 with Mallincam Xtreme video and multiple computers.

Eric Baumgartner, AstroPhysics 140 mm triplet refractor on AP Mach 1 mount. Perfection in glass, metal and wood.

Larry (& Elyse, not pictured) Faltz, Stellarvue SVR-105 triplet refractor on iOptron Mini-Tower

Other attendees:

- Eva Andersen, Televue 101NP alt-az
- Tom Boustead, Stellarvue 90mm refractor alt-az with Sky Commander
- Arthur Linker, Orion 10" Dob with Intelliscope
- Dave Butler, Meade LX-90
- Woody Umanoff and Don Hyatt, Orion 12" truss-tube Dob
- Chris Mayer, 8" MAG1 Instruments Portaball reflector
- New club member Ernest Wieting was a first time star party attendee. Welcome!

There were quite a few public visitors. Many people came for the Perseids. Astronomers showed off the usual summer wonders, including globulars M13, M92, M10 and M12, nebulae M17, M8 and M20, planetaries M27, M57 and M97, some open clusters, particular the Wild Duck M11, and galaxies M81 and M82. As M31 rose, many scopes turned to it. A good refractor is fantastic for double stars, and as usual Albireo was a showpiece and a good answer for one person's question, "Can you see anything in color?" It was fun for me to do visual rather than video for a change, and show people (and myself) the view in the eyepiece rather than the screen.

Larry Faltz