



The most wonderful discovery made by scientists  
is science itself.

*Jacob Bronowski*

Newsletter of the Pomona Valley Amateur Astronomers

Volume 31 Number 10

*nightwatch*

October 2011

### President's Message

In his 1923 poem "The Star-Splitter"--about a man who burns down his house and buys a telescope with the insurance money--Robert Frost wrote:

The best thing that we're put here for's to see;  
The strongest thing that's given us to see with's  
A telescope. Someone in every town  
Seems to me owes it to the town to keep one.  
In Littleton it may as well be me.

The New Hampshire Astronomical Society has taken these words as the motto for their Library Telescope Program. The idea behind the program is that public libraries should have telescopes available for library patrons to check out, just as they check out books. To that end, the NHAS has partnered with public libraries all over New Hampshire. Each partnership involves a commitment by both parties. At each library, one staff member acts as the telescope's minder and makes sure all of the bits are present and in working order between check-outs. A member of a local club also serves as the telescope's 'parent' and periodically attends to maintenance, like cleaning and collimating the optics.

Funds to purchase and maintain the telescopes come from the NHAS, the local libraries, and community groups. The scopes the NHAS has been placing are Orion StarBlast 4.5-inch reflectors, with a few easy modifications to make them sturdier and more user-friendly (like beefier collimation bolts to keep the optics in alignment longer).

In the three years that the Library Telescope Program has been in operation, the NHAS has placed telescopes in 26 public libraries across the state. The program has been wildly successful and has attracted some very high-level attention, including a profile in Sky & Telescope. The NHAS wants other

### Club Events Calendar

**October 14 – General Meeting**

**October 27 - Board Meeting, 6:15**

**October 29 - Star Party - Joshua Tree group camping area**

**November 4 - General Meeting**

**November 26 - Star Party - To Be Announced**

**December 9 - Holiday Party - 7pm at Sizzlin Skillets Upland**

**January 5 - Board Meeting, 6:15**

**January 13 - General Meeting**

**January 21- Star Party - To Be Announced**

**February 2 - Board Meeting, 6:15**

**February 10 - General Meeting**

**February 18 - Star Party - To Be Announced**

**March 1 - Board Meeting, 6:15**

**March 9 - General Meeting**

**March 24 - Star Party - To Be Announced**

**April 5 - Board Meeting, 6:15**

**April 13 - General Meeting**

**April 21 - Star Party - To Be Announced**

**May 3 - Board Meeting, 6:15**

**May 11 - General Meeting**

**May 19 - Star Party - To Be Announced**

**May 31 - Board Meeting, 6:15**

**June 8 - General Meeting**

**June 16 - Star Party - To Be Announced**

### President's Message continued

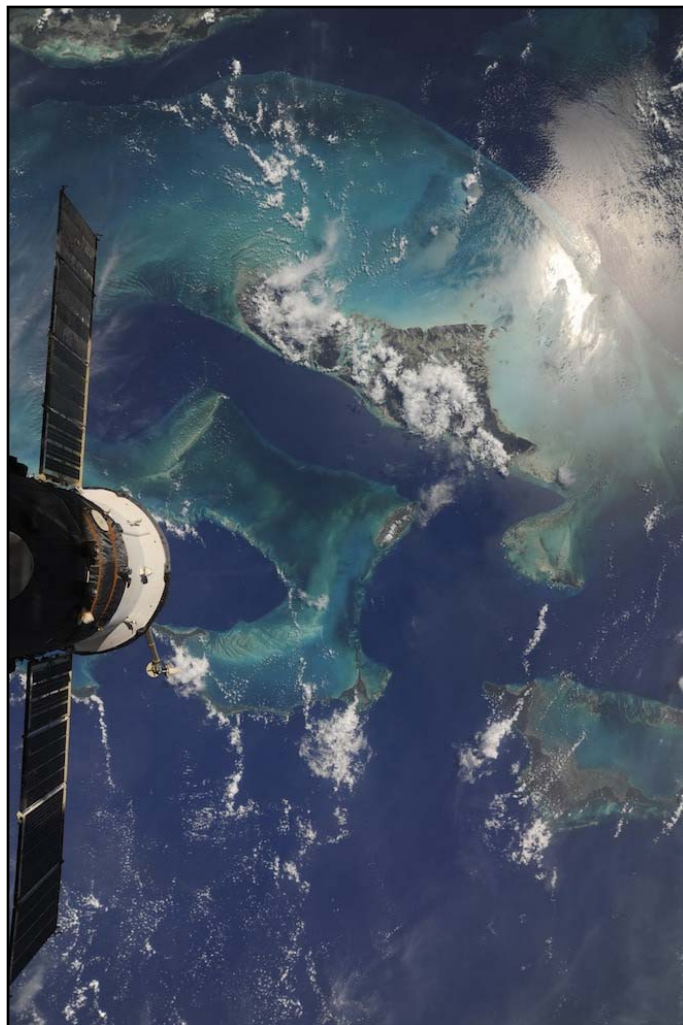
astronomy clubs to be able to follow in their footsteps, and to that end they have made every detail of their program freely available on their website, at <http://nhastro.com/ltp.php>.

The PVAA does not have the footprint or the resources to run a statewide library telescope program, but I see no reason why we could not partner with the Claremont Public Library to place and parent at least one telescope. I have been talking with both the administration of the Claremont library and with the PVAA board members about the possibility, and both groups are enthusiastic about exploring the possibility. It is possible that the Friends of the Library would even supply the funds to purchase and maintain the telescope. In which case all we would need to supply is a little time and know-how.

The board and I have agreed that the next step is to bring this possibility before the full membership of the PVAA and solicit opinions and ideas, and I will do this in a brief presentation at this month's meeting. If you can't make it to the meeting, I'd still love to hear from you--please feel free to email me at [mathew.wedel@gmail.com](mailto:mathew.wedel@gmail.com).

I think a library telescope program would be a great opportunity for the PVAA and the Claremont Public Library to come together and do something that would benefit the entire community. I can't think of a more dramatic and lasting way to reach out to those around us that look up in wonder. I'll look forward to hearing your thoughts as well.

*Matt Wedel*



A Ride Thru Space

Gary Thompson found an interesting slide show by Willard Coffey. Find it online at :

<http://www.slideshare.net/psjlew/a-ride-thru-space-9370640>

### PVAA Officers and Board

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## How Does It Work?

A Nobel Prize for the discovery of Dark Energy! When Einstein postulated his general theory of Relativity he only assumed that physics on earth should be the same as on an accelerating platform in space. The result was four second order differential equations. Any solution which satisfies these equations would offer new insight to how gravity works. After nearly 100 years we are still finding new solutions.

In science it takes about 100 years before a theory is considered reliable. Newton's theories were challenged successfully for that long and then certain things didn't work out. At the beginning of the twentieth century physicists were searching for new paradigms to explain the things observed that didn't fit Newton's equations. The result was the theories of Relativity and Quantum Mechanics.

The General Theory of Relativity states that gravity and the warping of time-space are equivalent. Cosmology applied this to a model of how the universe evolved and came up with the Big Bang as a best fit to everything we know. Then about 20 years ago two groups of astrophysicists decided to "weigh" the universe. As the contents of the universe went out due to the big bang, they should be slowing down due to their mutual gravitational pull.

A supernova 1A is a special type of supernova. Each one follows a pattern which results in the same brightness at the source as a function of time. By observing the brightness on earth, the distance to the nova can be calculated. By 1990 this had become an accepted method and they were called "standard candles."

Two teams independently searched for the type 1A supernovas in very distant galaxies. Then the red shift, based on the Hubble theory, would provide age and therefore the rate of expansion. The data could then be plotted to show the rate of expansion as a function of time. Everyone expected the results to show that the rate of expansion was slowing down. That slowing would be due to mutual gravity and thus the total mass of the universe could be calculated.

But the results by both teams showed just the opposite. Imagine the surprise. Neither team believed their own results at first. But when they compared notes, they both had the same result. The universe was expanding more rapidly than it did in its early life. In fact in the early years gravity was causing a slow down in the rate of expansion. Then at some point the distances became large enough that the force of gravity was overcome and the rate of expansion began to increase.

Theorists jumped on this and new concepts began to appear to explain the data. The data from WMAP (the plot of the microwave background from NASA) was considered. Everything pointed to a previously unknown force which we now call Dark Energy.

Keep in mind, however, that this is just the beginning of a new theory. We can expect a lot of ideas tested over the next 100 years before the theory is considered "reliable." The fun part is that we don't know the final answers. One observation with a surprising result can cause huge ripples in the land of science.

*Ken Crowder*

Do you have a topic you would like Ken to cover?

Please send your thoughts to: [nightwatch@pvaa.us](mailto:nightwatch@pvaa.us)

## September General Meeting

The September meeting started with a welcome to several new guests. They were asked to momentarily pardon the members as they elected all the candidates that were running for office. (It was sort of like a Cuban election. - Only one candidate per office.)

Lee gave his usual informative presentation of "What's up". As the Dawn spacecraft is now orbiting the asteroid Vesta, Lee made asteroids the subject of his talk. He showed a movie of Vesta made from photos taken by the Dawn spacecraft. Vesta was discovered in 1807. The first asteroid was discovered on New Year's Day in 1801. The most famous are Ceres (The biggest), which Dawn will visit next, along with Eros, Gaspra, Itokawa and Metilda. There are asteroids named after each member of the Beatles, Meg Ryan, Tom Hanks and many others. Once a person finds an asteroid, they get to name it, as long as it isn't offensive. There are so many asteroids that most don't have names, just ID numbers. YOU can name an asteroid for only \$59.95. (A great gift for some who has everything.) Go to the International Asteroid Database: <http://asteroiddatabase.com/>

Next we had an interesting presentation by Isaiah Little. He used a 5 mW laser pointer to demonstrate the particle and wave properties of light using the double slit test. Check out last month's newsletter, which showed the experiment in greater detail.

Our guest speaker was Dave Jurasevich. His topic was "Mt Wilson – The 1st 100 Years". Of course you can't talk about the Mt. Wilson Observatory without talking about the life of George Ellery Hale. Educated at MIT, George not only had big dreams, he was able to act on those dreams by getting investors to finance his visions. He started the Yerkes Observatory, Mt. Wilson Observatory, Mt. Palomar Observatory, the Hale Solar laboratory, and was a founding member of Cal-Tech (California Institute of Technology). - Which this year was rated the top university in the world, beating out Harvard for the first time.

In 1891 Hale created his own observatory with a 12 ½ inch solar refractor near Chicago.

In 1893 Hale got his father to finance the Yerkes Observatory which became operational in 1897. (It was the world's largest at the time.)

In 1903 Hale brought up a small solar scope to Mt. Wilson, followed a year later by the "Snow" Solar Telescope from the Yerkes Observatory. He spent \$30,000 of his own money to do this, betting on future financing.

In 1905 he signed a 99 year lease for the Mt. Wilson land from the State of California. It included a clause for a 99 year renewal for one dollar, which was exercised in 2004. - Much to the displeasure of the state, which had hoped for a rent increase.

In 1908 the 60" became the world's largest telescope. During the construction of the 60" George was already working on the 100" scope. (Which is actually 101 and 5/16 inches wide.)

In 1917 the 100 inch "Hooker" telescope became operational. The discoveries made by this telescope are too numerous to mention here.

Hale went on to start construction on the 200 inch Mt. Palomar telescope, but died before its completion in 1948 :

*Gary Thompson*

## What's Up - A Silver Coin, Fish's Mouth, & God's Eye

The Silver Coin Galaxy is so shiny and hard edged, it can be one of three galaxies visible to an unaided eye (the others are M31, M33). Also known as NGC 253 (the galaxy that rhymes) or Sculptor Galaxy for its southern home in the formless constellation of Sculptor. This dim constellation could be a sculptor, a sculptor sculpting, or his sculpture cluttered studio.

The Sculptor Galaxy was too far south for Messier, it was swept up in 1783 by Caroline Herschel in one of her comet sweeps. Its tilted oval glow stands out even in binoculars. It's 10 million light years away but it's a starburst spiral with a high rate of radiant star formation. Strong gamma and X-ray radiation in its center suggest an active black hole. Plasma "super winds" from star birth sweep out of its gleaming core into dusty outer arms.

Below this Silver Coin is our dark South Galactic Pole near globular cluster NGC 288. The starless pole makes NGC 253 easier to see, but it's still close to our horizon. Nearby are fainter galaxies and all are in an out branching of the Virgo Supercluster.

In a TV series *The Event*, the totally human aliens explain that they've just dropped in from NGC 253. It's on TV, so it's an important galaxy.

Near Sculptor is the fish shaped *Piscis Austrinus* (Southern Fish). Here, called the lonely star of Autumn, is its first magnitude star Fomalhaut (Fish's Mouth in Arabic). Fomalhaut is orbited by the only extra-solar planet to be actually photographed in visible wavelengths (by the Hubble telescope). This is because Fomalhaut is a neighborly 25 light years away. The existence of planet Fomalhaut b was indicated by its trail in a dust belt. This protoplanetary debris disk has a sharp inner edge. Here the Fomalhaut b planet can be seen as it plows its way through the dust. It's the coolest, lowest mass object ever imaged beyond our solar system. It's definitely larger than Jupiter, and has three times the mass. More distant than Pluto, it has an orbit of 872 earth years. It probably has a Saturn-like ring, but with an enormous radii equal to Jupiter's four Galilean moons.

Out beyond this chunky planet stretches a dust belt located as far out as our Kuiper belt. But Fomalhaut is over twice as large as our sun and 18 times brighter. It's a young Vega like star able to illuminate this disc where other outer planets could be forming. The disc lies on the star's equatorial plane reaffirming theories of planetary formation.

Fomalhaut b is the most visible on a growing list of known extra solar planets. Back in 1994 the first confirmed extra solar planet was located orbiting a sun-like star, 51 Pegasi. The list of understandably giant planets around nearby stars has now grown to over 600. Still a star is typically a billion times brighter than any planet. One must detect a planet causing a star

to change its center of gravity in respect to background stars. This locates massive "hot Jupiter" planets orbiting close in. Or see a transiting star causing a tiny drop in its primary's starlight. Earth-like planets that might harbor life-forms are obviously extremely hard to locate.

Just north of the "fish's mouth" star, near the asterisms of "trickling water" from the jug of Aquarius (Water Carrier) is the Helix Planetary Nebula (NGC 7293). Its ocular shape cause it to be seen as "God's Eye" peering down on us foolish mortals. It's the largest and nearest of all planetary nebula but was never seen by Messier due to its low surface brightness. It was discovered in 1824 by Karl Ludwig Harding and can resemble an eye



shaped version of the famous Ring Nebula. It was the first PN to contain "cometary" nebulous knots with heads and tails. It's 700 light years away and 2.5 ly in diameter. Colorfully alarming infrared images of Helix Nebula (pictured) by Spitzer space telescope show as many as 20,000 nebulous knots radiating explosively away from the illuminating white dwarf star at the nebula's center.

A second scarier "Eye of God" planetary lies below our horizon near the Southern Cross in Musca (The Fly). Called the Hourglass Nebula, it's 8,000 ly away, you can't see this creepy eyeball without the Hubble Telescope.

So deep sky objects take on the reverse of costumed Halloween identities. Their weird, disturbing and ghostlike shapes wear familiar names to reassure us that the unknowable universe is just like us.

*Lee Collins*

## 21 Lucky People Visit Mount Wilson

On Saturday, September 24th PVAA made its 11th successful trip up Mount Wilson to observe with the 60-inch scope. We made one unsuccessful trip (excessive humidity) and one trip had to be canceled (high winds). We ended up with 21 people attending. At one point we had 25 signed up to go but, a few couldn't make it. I had thought that this was first time we ever got up to 25 but, a check of the records shows that we had 25 on September 3rd 2003 for our Mars observing session. Still, this was one of the better turnouts.

Before our observing session we received a tour of the 60-inch and 100-inch domes from Gale Gant. After learning some of the history of Mount Wilson from Dave Jurasevich at the September general meeting it was great getting to see firsthand where it all happened.

After the tour, we gathered around the dome for a short safety lesson. Before 7:00, the sun set. We all went into the dome and waited for it to get dark. It wasn't long before the shutter was opened and we saw stars above the dome. What a wonderful sight. By about 7:30 we were observing.

First we looked at Vega and then Epsilon Lyrae (the Double, Double) just to get an idea of what the seeing was like. On a scale of 1-5, I would say it was a 3.

Next we looked at M13, the globular cluster in Hercules. In the 60-inch scope it takes up the entire field-of-view. Bright stars were resolved to the center, but I felt like I was also seeing clumps of faint stars in the center of the cluster.

Around 8:40 we looked at M57, the Ring Nebula. I was not seeing the central star continuously, which indicates that the seeing was not as steady as we have sometimes experienced. Still it was a good view of the object.

Next we looked at Comet Gerrard which was plainly visible. Sky and Telescope puts it at about 7th magnitude. Some said that they could see a tail. I did not, but that could have been due to the small field-of-view. Had I not been told what I was looking at, I could easily have mistaken the comet for a small galaxy.

Between 9:20 and 11:15, we looked at three planetary nebulae, NGC 6543 (The Cat's Eye Nebula), NGC 6826 (the Blinking Nebula), and NGC 7009 (the Saturn Nebula). The Cat's Eye and the Saturn Nebulae were both impressive, but the Cat's Eye was not as good as I have seen it in the past from Mount Wilson. The Blinking Nebula does not blink in the 60-inch scope.

We also looked at Campbell's Hydrogen Star during this time. It is a Wolf-Rayet star and has the most distinctly red nebula around it that I have ever seen through an eyepiece. The color is due more to Nitrogen in the nebula than Hydrogen. Interestingly, in 1893 it was initially reported as a planetary nebula, thus the PK 64+5.1 designation. It is still often described as planetary nebula. The best I can tell Wolf-Rayet stars were once thought to be a type of planetary nebula. It is now known that they are extremely massive stars that are blowing off material at a rapid rate, perhaps one solar mass every 10,000 years. They are much more massive than the Sun-like stars that form planetary nebulae.

During the middle of the night we looked at planets and one former planet. *No, not that former planet.* We looked at Ceres,

the first discovered of the asteroids. (This was my first view of Ceres.) Soon after Giuseppe Piazzi announced his find in 1801, Ceres was believed to be the planet between Mars and Jupiter, predicted by the Titius-Bode Law. Now it is the only dwarf planet inside the orbit of Uranus.

We also looked at Jupiter, Uranus, and Neptune. I was hoping we might see detail on Neptune but, we did not. At a distance of nearly three billion miles, it was just small blue dot. We could see some detail in the cloud bands of Jupiter. The seeing had improved after midnight but, was still not as good as I had hoped. The marine layer came in too, making the sky quite a bit darker. We looked at M15 during this time. It is a spectacular globular cluster in the 60-inch. Some said that it was better than M13. M15 in Pegasus is smaller than M13 but, its stars are more densely packed.

Around 2:15 we looked at NGC 7331, the large spiral galaxy in Pegasus. It was quite nice, with the help of the marine layer. Immediately after NGC 7331, the telescope was trained on NGC 7662 (the Blue Snowball). We could make out some structure in the nebula.

With the aid of the marine layer we looked at G1, a globular cluster in M31. It was small but easily visible. M31 itself is far too large for the field-of-view of the 60-inch. We did look at the center of the galaxy though.

At 3:15 we tried Jupiter again. I was hoping that the steadiness of the atmosphere had improved over the last couple of hours. Instead it was worse, so we turned to the Trapezium in M42. The stars of the Trapezium and the surrounding nebula were truly breathtaking. With its enormous light grasp, the 60-inch reveals many faint stars around the trapezium. It was one of the highpoints of the night.

As dawn approached, we quickly took in NGC 604 and NGC 891. The first is a nebula in M33 and the second is an edge on spiral galaxy in Andromeda. Thanks to the clouds below, both were quite good.

Although I was warned that it would be disappointing, I asked to see M1 (the Crab Nebula). Actually, I was not disappointed. I felt that I was seeing a fair amount of filamentary structure in the nebula. Again, thanks to the clouds below. By now dawn was rearing its head, ugly or otherwise. We looked at Rigel which is a double star as well as a system often visited by J. T. Kirk and the USS Enterprise NCC-1701. Rigel is not a close double but, the very great difference in brightness makes it difficult in a small scope. It was not a problem for the 60-inch.

Another, better known and far more difficult double is Sirius. Sirius A is magnitude -1.47 and 10,000 times brighter than magnitude 8.44 Sirius B. With a separation of less than 3 arc-seconds this is an extremely challenging double. But both components were easily visible in 60-inch scope.

Last, as the sky was just starting to brighten, we looked at Mars. The Red planet was still about 1.9 AU away but, presented a small (4 arc-second) orangish disk with some surface detail visible.

Observing with such a large and history making telescope is truly a wonderful experience. I believe that everyone who attended had a great time. I know I did. I am already planning another trip for next year. When we have a date reserved it will be announced.

*Ron Hoekwater*