



# nightwatch

Newsletter of the Pomona Valley Amateur Astronomers

Volume 37 Number 07

*nightwatch*

July 2017

A man gazing on the stars is proverbially at the mercy  
of the puddles in the road.

*Alexander Smith*

## President's Message

Big strides in space travel this past month. On June 23 and June 25, SpaceX launched and landed two Falcon 9 rockets within 48 hours. The June 23 flight was the second time that SpaceX has launched and landed a previously-used first stage. Then on July 3, a SpaceX Dragon splashed down after a cargo mission to the International Space Station, marking the first time that a Dragon capsule had been successfully launched and recovered twice.

Jupiter and Saturn are still putting a good show in the evening sky, with Jupiter still up until about midnight. The summer Milky Way is rising in the evening as well, providing endless observing opportunities for telescopes, binoculars, and--under dark enough skies--the naked eye.

I'm happy to report that most folks have gotten their dues in, but there are a few we're still waiting to hear from. If you still need to pay your dues, please mail them in or give them to me or

another of the club officers at the upcoming general meeting. Dues are \$30 for individuals and \$40 for families.

Our speaker this month is, er, me! My topic will be, "Exploring the universe with binoculars". I'll share some of the objects I've written about for the 'Binocular Highlight' column in Sky & Telescope magazine, and I'll have a handout with 30 of my favorite deep-sky objects to keep you observing all year round.

An important reminder - this month we are meeting in our old stomping ground, Beckman Hall, and not Shanahan B460 where we've been meeting for the last couple of years. We'll be back in Shanahan in August and for the rest of the year. I'll look forward to seeing you Friday night.

*Matt Wedel*

## PVAA Officers and Board

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PVAA General Meeting 6/9/17

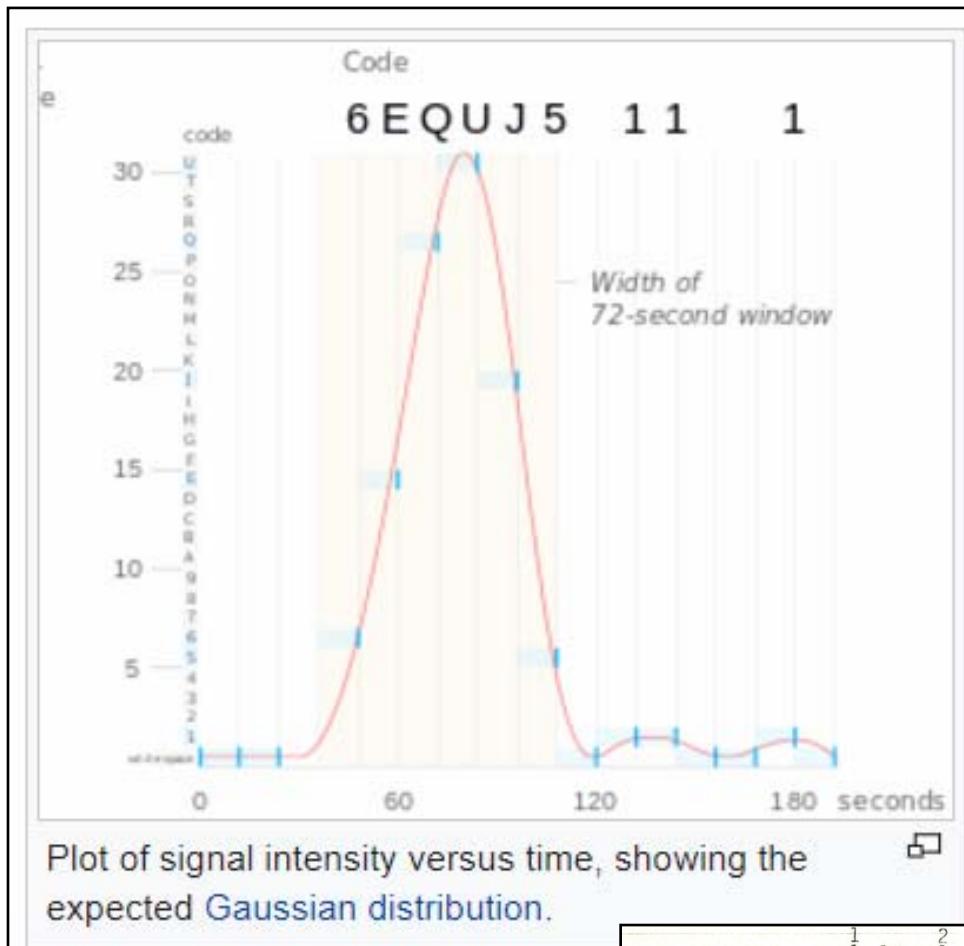
PVAA President Mathew Wedel opened the meeting with announcements, followed up by a presentation by Steve Sittig with a follow-up on the 1973 Wow! Signal. On 08/15/1977 at 02:16 UTC Ohio State University's Big Ear Radio Observatory received a 72 second signal that was much louder than the usual background noise. It originated from the direction of the constellation Sagittarius. It was discovered a few days later by astronomer Jerry Ehman when he was reviewing the data.

Ehman was so taken aback by the signal strength that he circled the reading on the printout and wrote 'Wow!' next to it. The radio telescope was tuned to the frequency of 1420 megahertz, which is naturally emitted by hydrogen. It was theorized in a 1959 research paper by Philip Morrison and Giuseppe Cocconi that an extraterrestrial civilization would use

that frequency to communicate. No other transmissions from that wavelength and that part of the sky have been received above the usual background noise level.

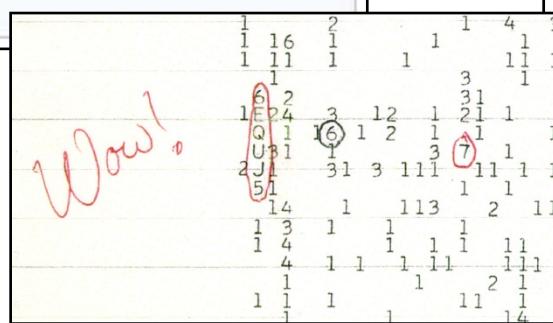
In 2017 Antonio Paris theorized that the Wow! Signal was from hydrogen clouds surrounding 2 comets: 266P/Christensen and 335P/Gibbs. While comets do show an increase in signal strength in the 1420 megahertz band, it is not nearly as strong as the Wow! Signal. The Big Ear Radio Observatory has since been dismantled, and other radio telescopes even larger than Big Ear did not detect the signal, or any follow-up to the signal. Ehman still believes that it was an extraterrestrial civilization that sent the signal.

Gary Thompson



Plot of signal intensity versus time, showing the expected Gaussian distribution.

More Wow! Info:  
<https://futurism.com/the-40-year-old-mystery-of-the-wow-signal-was-just-solved/>  
<https://phys.org/news/2017-06-wow-mystery-space.html>  
<https://www.livescience.com/59442-astronomers-skeptical-about-wow-signal.html>  
<https://www.youtube.com/watch?v=OkycNvrpiCs>



## PVAA General Meeting 6/9/17 Continued

Alex McConahay was the main speaker for the night. His presentation was titled ‘Nightscapes’. First Alex reminded the PVAA members that PVAA helped the RAS (Riverside Astronomical Society) purchase its GMARS site (Goat Mountain Astronomical Research Station). We are welcome to use it when it is open. He also reminded us of the annual ‘Nightfall’ event in Borrego Springs. This year it will be October 19-22. <http://nightfallstarparty.com/>

Alex handed out a ‘Nightscapes Checklist’ that you should copy and use. He emphasized the need to know your SLR camera BEFORE trying to set it up for the shot. Fumbling with unfamiliar controls in the dark of night is frustrating. Also focus on infinity and mark the location. Many cameras will move beyond the infinity focus and will leave you with out of focus results.

Make sure you have a solid tripod – not the \$14.95 special – as you don’t want a slight breeze to ruin the timed exposure. You will want to lock down the tripod, and use a remote release or a self-timer set at 2 or more seconds to dampen any vibrations. As for how long an exposure, he informed us of the “Rule of 500” for shutter time. This is 500/focal length, or 500 divided by the mm (millimeter) of the camera lens. For example: If you have a camera with a 55mm lens, then  $500/55 = 9$  second exposure max. If you take a longer exposure, you will have noticeable star trails. The “scapes” part of ‘Nightscapes’ is framing the stars with foreground objects – trees, monuments, mountains, etc. You can use your mobile phone (not the LED light but the front of the phone on white) and, being behind the camera, wave the phone around to highlight the objects in the foreground, if they are close enough. The first shot should be a ‘test shot’. – Look at it. Is there anything in the frame that you don’t want to be there? – Do you need to adjust where the camera is to avoid the ‘distraction’? – Adjust & Repeat until happy.

You will want to set the camera on the highest ISO that you can. Sometimes a very high ISO will cause ‘noise’, so trial and error is needed as you learn your camera’s capabilities.

Take a notebook and write down what your exposures were, what was different from the previous exposure, etc. When processing the pictures, always work on copies of the original, not the original itself.

Alex showed some truly awesome pictures he took as examples. You only need a Digital Single Lens Reflex camera, and a good tripod. So – Here’s to Good Shooting!

*Gary Thompson*

<http://www.alexastro.com/>  
<http://www.rivastro.org/index.php>

GMARS site:

<https://www.google.com/maps/dir//34.290847,-116.383677/@34.2908271,-116.4537171,24223m/data=!3m2!1e3!4b1!4m4!4m3!1m0!1m1!4e1?hl=en>

The world at night (great pics):

<http://twanight.org/newTWAN/index.asp>

## White Mountain Star Party

My favorite star party site is Grandview Campground in the White Mountains. The site is very dark, the summer, nighttime temperature is mild, and around the new moon there are always other astronomers. I also enjoy the natural history and beauty of the area. The White Mountains have the oldest living things, Bristlecone Pines and the 3<sup>rd</sup> highest peak in California, White Mountain.

The White Mountain Astronomers and the San Bernardino Valley Amateur Astronomers were in the campground when we arrived. It was great sharing the site with so many other stargazers. From PVAA, Craig Matthews, Gary Thompson, Frank Nelson, and Kay and Ken Hoevel were there.

The weather was great for PVAA’s June star party at Grandview Campground. My experience is that the farther into summer it gets, the more storms and clouds there are. This trip, it was clear all 4 nights, except for the first couple hours of Friday night. My 25-inch Obsession was busy.

During the day we went hiking and exploring in 4 wheelers. I traveled some roads I had wanted to investigate for many years. When it is time to leave, I always hate to go. I would certainly have stayed at least one more day, but I had a dentist appointment scheduled and had to be back by Tuesday morning.

If you haven’t been there, I highly recommend a trip to the White Mountains.

*Ron Hoekwater*

## Club Events Calendar

**July 7 General Meeting - Matt Wedel**  
**"Exploring the universe with binoculars"**

**July 22 Star Party -Culp Valley Campground, Anza Borrego**

**July 26 Board Meeting**  
**August 4 General Meeting-Vatche Sahakian**  
**August 12 Star Party - Cow Canyon Saddle, Mount Baldy**

**August 30 Board Meeting**  
**September 8 General Meeting**  
**September 23 Star Party - Palomar Mountain and Observatory tour 10 AM**

**September 27 Board Meeting**  
**October 6 General Meeting**  
**October 21 Star Party - Nightfall, Anza Borrego**

**October 25 Board Meeting**  
**November 3 General Meeting**  
**November 18 Star Party - Landers GMARS**

**November 29 Board Meeting**  
**December 9 Holiday Party**

## Nightscapes Checklist

### Setup

Camera Custom Functions and Presets  
 Learn Infinity Focus position  
 Mirror Lockup (no?)  
 Long Exposure Noise Reduction (yes?)  
 High ISO Noise Reduction (yes?)  
 LCD Brightness (Dimmer)  
 Auto Off (eight minutes +)  
 Review time (four seconds +)  
 Picture Quality/File Type (RAW + Large)  
 White Balance (Tungsten—3400-4400)  
 Function Dial (Manual)  
 Image Stabilizer (off)  
 Auto Focus (off)  
 Lens Hood (yes), Filter, (no)  
 Set Self-timer to 2 seconds or program remote release  
 Mount Camera  
 Lock everything that can be locked on tripod  
 Tie down straps, remote, etc.

### Taking an Image

Check Setup  
 Focus  
 Aim at bright star (anywhere in sky)  
 Wide Angle/viewfinder/center and focus  
 Tele Angle/viewfinder/center and focus  
 Imaging Zoom Setting/LiveView-LCD Screen/Loupe  
 Find star/Position Magnify Box,  
 Magnify by 10 (highest)  
 Focus Manually  
 Remove color fringe  
 Test Image (*Composition*)  
 Aim at subject  
 Shutter at 10 seconds (more if needed)  
 Widest aperture (F smallest possible number)  
 Highest ISO available (6400/12800 is OK)  
 Take and Evaluate Image  
 composition  
 sweep corners

*These suggestions are for those just starting in Nightscape photography with basic equipment and experience.  
 Experiment and change as you get comfortable.*

lens aberrations at full aperture  
 fill frame  
 local lights/distractions, etc.  
 Adjust/Repeat until happy  
 Lock Tripod  
*Test Image (Exposure)*  
 Apply "Rule of 500" for shutter time  
 Exposure time=500/focal length  
 Widest aperture (F smallest possible number)  
 ISO 800 (more if camera is clean)  
*Evaluate Image*  
 Histogram—one third across  
 Star shapes—magnify and check corners  
 Adjust ISO higher if possible  
 Adjust/Repeat until happy  
*Final Shots*  
 Set self timer or remote release.  
 Take several images at any given setting  
 Do both Horizontal and Vertical Alignment  
 Vary ISO/Time/Aperture as you like  
*Take Notes*  
 For Every Exposure:  
 Take a deep breath  
 Press shutter/remote button  
 Wait for self timer (if no remote)  
 Wait for shutter  
 Wait for "ICNR" time if used  
 Review  
 Light Painting (Highlight foreground)  
 Diffused Flashlight (or Cellphone)  
 Wave and move to avoid harsh shadows  
*Experiment*

### Processing

*Do Not Work on Originals*  
 File Explorer or Image Viewer  
 Fix  
 Move sliders to make pleasant picture  
 Change Exposure, Color Balance, etc.



Print:

*Photography Night Sky*, Jennifer Wu/James Martin, Mountaineer Books  
**Good People:** Riverside Astronomical Society [rivastro.org](http://rivastro.org)  
**Software:** Helicon Filter [heliconsoft.com](http://heliconsoft.com) (and many others)  
**Presenter:** [alexmcconahay@gmail.com](mailto:alexmcconahay@gmail.com) [alexastro.com](http://alexastro.com)  
**Presentation:** (Google+) *The Astro Imaging Channel* *Nightscape*

### Resources

**Web:** The World At Night [twanight.org](http://twanight.org)

**Web:** Wally Pacholka [astropics.com](http://astropics.com)

**Web:** Any Search Engine for *Nightscape Photography*

**Classes:** [dennismammana.com](http://dennismammana.com)



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## The Shape of the Solar System

When Stamatios (Tom) Krimigis was selected for the Voyager mission in 1971, he became the team's youngest principal investigator of an instrument, responsible for the Low Energy Charged Particles (LECP) instrument. It would measure the ions coursing around and between the planets, as well as those beyond. Little did he know, though, that more than 40 years later, both Voyager 1 and 2 still would be speeding through space, continuing to literally reshape our view of the solar system.

The solar system is enclosed in a vast bubble, carved out by the solar wind blowing against the gas of the interstellar medium. For more than half a century, scientists thought that as the sun moved through the galaxy, the interstellar medium would push back on the heliosphere, elongating the bubble and giving it a pointy, comet-like tail similar to the magnetospheres—bubbles formed by magnetic fields—surrounding Earth and most of the other planets.

"We in the heliophysics community have lived with this picture for 55 years," said Krimigis, of The Johns Hopkins University Applied Physics Laboratory in Laurel, Maryland. "And we did that because we didn't have any data. It was all theory."

But now, he and his colleagues have the data. New measurements from Voyager and the Cassini spacecraft suggest that the bubble isn't pointy after all. It's spherical.

Their analysis relies on measuring high-speed particles from the heliosphere boundary. There, the heated ions from the solar wind can strike neutral atoms coming from the interstellar medium and snatch away an electron. Those ions become neutral

atoms, and ricochet back toward the sun and the planets, uninhibited by the interplanetary magnetic field.

Voyager is now at the edge of the heliosphere, where its LECP instrument can detect those solar-wind ions. The researchers found that the number of measured ions rise and fall with increased and decreased solar activity, matching the 11-year solar cycle, showing that the particles are indeed originating from the sun.

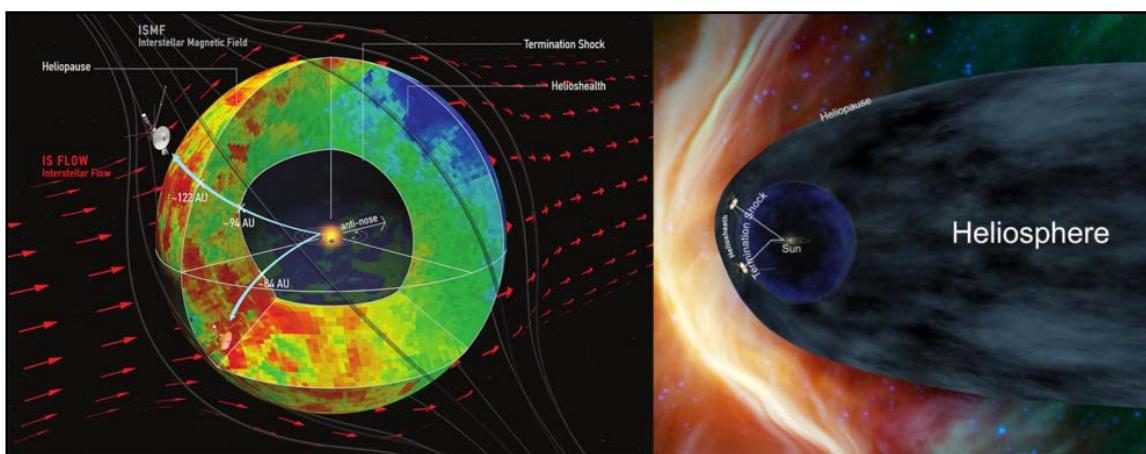
Meanwhile, Cassini, which launched 20 years after Voyager in 1997, has been measuring those neutral atoms bouncing back, using another instrument led by Krimigis, the Magnetosphere Imaging Instrument (MIMI). Between 2003 and 2014, the number of measured atoms soared and dropped in the same way as the ions, revealing that the latter begat the former. The neutral atoms must therefore come from the edge of the heliosphere.

If the heliosphere were comet-shaped, atoms from the tail would take longer to arrive at MIMI than those from the head. But the measurements from MIMI, which can detect incoming atoms from all directions, were the same everywhere. This suggests the distance to the heliosphere is the same every which way. The heliosphere, then, must be round, upending most scientists' prior assumptions.

It's a discovery more than four decades in the making. As Cassini ends its mission this year, the Voyager spacecraft will continue blazing through interstellar space, their remarkable longevity having been essential for revealing the heliosphere's shape.

"Without them," Krimigis says, "we wouldn't be able to do any of this."

**Marcus Woo**



Caption: New data from NASA's Cassini and Voyager show that the heliosphere—the bubble of the sun's magnetic influence that surrounds the solar system—may be much more compact and rounded than previously thought. The image on the left shows a compact model of the heliosphere, supported by this latest data, while the image on the right shows an alternate model with an extended tail. The main difference is the new model's lack of a trailing, comet-like tail on one side of the heliosphere. This tail is shown in the old model in light blue.

**Image credits:** Dialynas, et al. (left); NASA (right)

To teach kids about the Voyager mission,  
visit the NASA Space Place:  
<https://spaceplace.nasa.gov/voyager-to-planets>