nightwatch
Newsletter of the Pomona Valley Amateur Astronomers

Human folly does not impede the turning of the stars. ***Tom Robbins***

VIRTUAL CLUB EVENTS SEE WEBSITE FOR DETAILS

Volume 41 Number 04 ***nightwatch*** **April 2021**

President's Message

First, a reminder that it's time to pay our annual Club dues. Rates remain a bargain at $30 for individuals and $40 for families. Unless you are lucky enough to catch Gary or me at an in-person event, a check can be sent to:

PVAA
Attention: Treasurer
P.O. Box 162
Upland, CA 91785

We have a special lineup for this month's meeting on Friday April 30th at 7:30 PM, with several of our knowledgeable members stepping up to present. First there will be Gary talking to us about recent events at Space X, then Steve Sittig will discuss Comet 21/Borisov. Next will be our usual snack and social time break then we'll learn about Wapakoneta Shawnee Astronomy from Ken Elchert. Last but not least, you'll hear from me about the curious history of the Willamette meteorite.

Hope to see you there!

Matt Wedel

Club Events Calendar

Apr 30	**General Meeting – Member Presentations**
May 8	**Star Party – TBD**
May 19	**Board Meeting**
May 28	**General Meeting – Clyde Plymate "Big Bear Solar Observatory"**
Jun 12	**Star Party – TBD**
Jun 16	**Board Meeting**
Jun 25	**General Meeting (presentation: TBD)**
July 10	**Star Party – TBD**
July 14	**Board Meeting**
July 23	**General Meeting (presentation: TBD)**
Aug 7	**Star Party – TBD**
Aug 11	**Board Meeting**
Aug 20	**General Meeting (presentation: TBD)**
Sep 4	**Star Party – GMARS**
Sep 8	**Board Meeting**
Sep 17	**General Meeting (presentation: TBD)**
Oct 9	**Star Party – TBD**
Oct 13	**Board Meeting**
Oct 22	**General Meeting (presentation: TBD)**
Nov 6	**Star Party – TBD**
Nov 10	**Board Meeting**
Nov 19	**General Meeting (presentation: TBD)**
Dec 11	**Christmas Party**

General Meeting March 26, 2021

We had 25 connections with about 30 people 'attending' our March general meeting. Next month we will be holding elections for several board member openings.

Our speaker for the night was Salem Emara, a NASA JPL Solar System Ambassador, and his presentation was on the Mars 2020 Perseverance Rover. First, Salem talked about where we came from and our search for life. He bought up how we have explored Mars so far in the last 10 years, from MRO – Mars Reconnaissance Orbiter, the rovers Spirit and Opportunity, ESA Mars Express and other probes sent to the red planet.

Perseverance has 4 Mars science goals: 1-Determine if life ever arose on Mars. 2-Understand Martian climate processes and history. 3-Determine how the surface and interior of Mars evolved. 4-Prepare for human exploration. For the last goal, Perseverance will collect samples of the surface for the upcoming sample return mission. That mission will retrieve the samples and send them back to Earth. Also for the last goal is the oxygen production experiment. (MOXIE - Mars Oxygen In-Situ Resource Utilization Experiment) This takes the carbon dioxide from the atmosphere and creates breathable oxygen that can be used for fuel and life support. MOXIE is designed to generate 10 grams of oxygen per hour (A human needs 33 grams of oxygen per hour).

Perseverance, also called Percy for short, was launched on 7/30/2020 at 11:50 UTC on an Atlas V-541 (5-meter fairing, 4 solid rocket boosters, 1 upper stage engine), and landed on 2/18/2021 at 20:55 UTC – 203 days (6 months 19 days 9 hours 5 minutes). Percy is based on the Curiosity rover with thicker wheels that are more durable and have a smaller width but greater diameter. Percy's robotic arm is longer and stronger, being 6 ft 11 in long. There is a secondary arm – the Sample Handling Assembly (SHA) used to move soil samples to the Adaptive Caching Assembly on the underside of the rover. This rover also has a small helicopter named Ingenuity, or Ginny for short. Ginny weighs 4 pounds, has its batteries, a solar cell, communications to talk to the rover and 1 camera. Scientists on Earth must communicate to the helicopter through the rover.

Other instruments on board Perseverance include the MastCam-Z – 2M Pixel, 100mm zoom that is 10 times more sensitive that your typical cellphone camera. The SuperCam can fire a laser and analyze the chemical spectrum from more than 20 feet away. MEDA – Mars Environment Dynamic Analyzer has an air temperature sensor, a radiation and dust sensor, a humidity sensor, a thermal infrared sensor and wind sensors. RIMFAX – Radar Imager for Mars' Subsurface Experiment uses radar waves to see geologic features under the surface. It is named from Hrimfaxi – a Norse mythology horse. SHERLOC – Scanning Habitable Environments with Raman and Luminescence for Organics and Chemicals is an ultraviolet Raman spectrometer.

The rover landing site was named the Octavia E. Butler Landing site in Jezero crater: 18.4446 N 77.4509 E. Its parachute had the words "Dare mighty things" in code, which was quickly deciphered by the public upon landing. Currently NASA is naming local Mars features that Perseverance discovers in the Navajo language. NASA named a rock "Máaz", which is "Mars" in Navajo.

EDL from Perseverance's cameras:

https://www.youtube.com/watch?v=4czjS9h4Fpg

https://www.nasa.gov/perseverance

https://mars.nasa.gov/mars2020/news/

Gary Thompson

Satellite Constellations vs. Astronomer's Constellations

Here is a link shared by member Ludd Trozpek which discusses the challenges of developing a way to handle both broadband satellites and astronomical observations.

https://www.bloomberg.com/opinion/articles/2021-04-22/as-satellites-proliferate-telescopes-go-dark?cmpid=BBD042221_CUS&utm_medium=email&utm_source=url_link&utm_term=210422&utm_campaign=closeamericas

PVAA Officers and Board

Officers

President ….....	Mathew Wedel	909-767-9851
Vice President ..	Joe Hillberg	909-949-3650
Secretary	Ken Elchert	626-541-8679
Treasurer	Gary Thompson	909-935-5509
VP Facilities	Jeff Felton	909-622-6726

Board

Jim Bridgewater (2022).....	909-599-7123
Richard Wismer(2022)	
Ron Hoekwater (2021).....	909-706-7453
Jay Zacks (2021) …….	

Directors

Membership / Publicity....	Gary Thompson ..	909-935-5509
Outreach	Jeff Schroeder	909-758-1840
Programs	Ron Hoekwater	909-391-1943

Star Party in the Park – April 17, 2021

PVAA members and guests converged on Cahuilla Park to enjoy a nice open, treeless view of the sky above Claremont. The first quarter moon was the star of the show but we also observed M42 – the Orion Nebula – as well as Mars and the naked eye double Mizar and Alcor in handle of the Big Dipper. Closer looks at the double over the years have revealed it is actually a sextuple system. In the 1600s a colleague of Galileo's realized by looking through a telescope that Mizar was a binary system and in the 1800-1900s it was discovered that each of the binaries was a binary itself – making Mizar a 4-star system. Then in 2009 it was shown that Alcor was also a binary, bringing us to the current total of 6 stars in all.

In the Park in the Dark

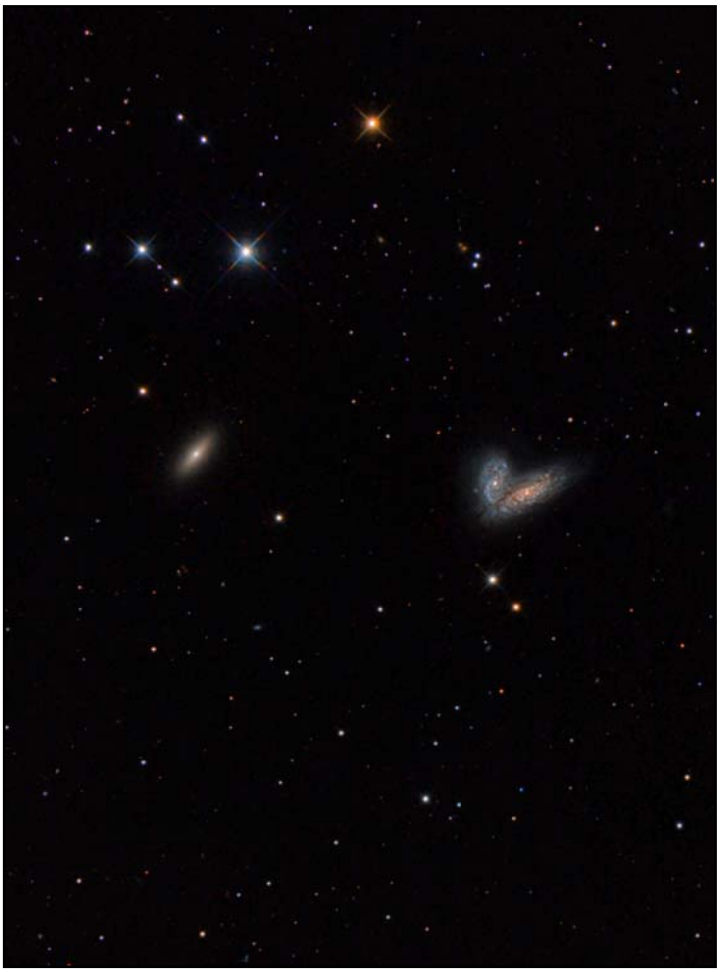
Now for the fun part – we had a total of 18 members and guests in the park, sharing views through around six telescopes; as well as I could count both people and equipment in the darkish evening. Attendees spanned the longest range possible. Long time/founding members Jeff Schroeder and Mark Moran joined a few couples who became members over the last couple of months and were attending their first in person event along with two guests who joined us for the very first time. New member Gina really got into the swing of things as she'd heard our usual meeting routine involved snacks and she provided us all with a couple of chocolate chip cookies to continue the tradition! I hope the founding members were as pleased as I to discover their creation still going strong and engaging people 50+ years later to share the beauty of the night sky!

Claire Stover

It's Galaxy Season

New moon was Sunday, April 11, so Cindy and I headed out to the dark site for camping and imaging on the 9th. Before we left, the weather forecast was excellent for both nights, however, it changed to high clouds for Saturday night after we got there. Friday was a very nice night, though. The occupancy forecast for the campground was much more accurate – it was packed, with nearly every campsite occupied. But, in spite of all the lights surrounding us, the image came out pretty good.

It is galaxy season, the time of year when the nighttime sky is facing away from the Milky Way's center and looking through fewer local stars into the vastness of the universe. My target this month was NGC 4567 (the more bluish of the two) and 4568, the Butterfly or Siamese Twins Galaxies, both spiral galaxies. As a bonus, NGC 4564, an elliptical galaxy, is in the image as well. I've wanted to image the Siamese Twins for quite a while, but I haven't had a good setup for them until last year. The twins are colliding about 52 million light years away, in Virgo, and they provide a snapshot of what the Milky Way and Andromeda Galaxy merger might look like to aliens in a distant galaxy some 4 to 5 billion years from now. The centers of the two galaxies are about 20 thousand light years apart. I've managed to capture some detail in the spirals of the Twins, but would need a larger telescope and steadier skies to really pull out the detail due to their small size of about 5x5 arcminutes. NGC 4564 lies about 58 million light years away and along with the Twins are part of the Virgo cluster of galaxies. Finally, if you look closely, there are several, even more distant galaxies in the background.



This was the first opportunity to use my new filters in a dark sky. I still had difficulty getting the color balance right. Fortunately, there is a G2V star (the same "color" as the sun) in the frame for color balancing. It's the bright white star with red-tipped spikes. When I balanced the color to make that star white, the background was too red! After neutralizing the background, the overall color looked better, but that bright red star is still too red for my liking.

The image is an LRGB composite, meaning frames were shot through a clear or luminance filter, and red, green, and blue filters. The RGB frames were stacked and combined to provide color, while the luminance frames were stacked to provide fine detail. In all, 33 luminance, 14 red, and 17 green and blue frames were used. Most were collected Friday night, with each being 5 minutes in exposure length, for a total of 6 hours, 45 minutes of data. The frames were all binned 2x2, meaning each group of 2x2 pixels were combined to make one larger pixel. During stacking, the images were drizzled by a factor of 2 essentially bringing them back to full resolution. They were calibrated with 20 dark, flat, and flat dark frames. After balancing the color, the RGB image was imported into Photoshop where it was stretched to bring out faint details and the color was intensified. The luminance frame was imported into FITS Liberator for initial stretching, then sharpened and further brightened in Photoshop. Finally, the luminance image was overlaid onto the RGB image for fine-tuning the color intensity, noise reduction and gradient removal. The image came out far better than I expected for less than 7 hours of data.

Next month there are two opportunities for imaging since new moon is on a Tuesday. Both the weekend before and the weekend after should provide sufficiently dark skies for imaging. But, it is also May which is notorious here for overnight cloudiness. Hopefully at least one weekend will be clear. Until then, enjoy April's image.

Ron Ugolick

NASA Night Sky Notes May 2021

This article is distributed by NASA Night Sky Network

The Night Sky Network program supports astronomy clubs across the USA dedicated to astronomy outreach. Visit nightsky.jpl.nasa.gov to find local clubs, events, and more!

Virgo's Galactic Harvest

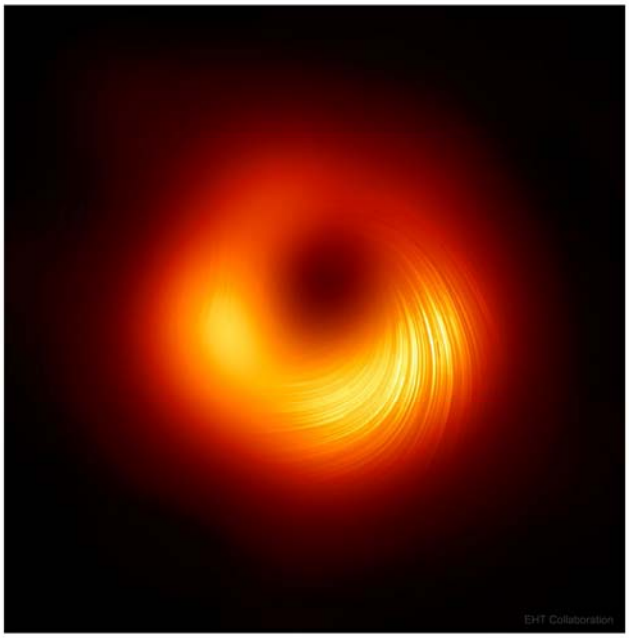
David Prosper

May is a good month for fans of galaxies, since the constellation Virgo is up after sunset and for most of the night, following Leo across the night sky. Featured in some ancient societies as a goddess of agriculture and fertility, Virgo offers a bounty of galaxies as its celestial harvest for curious stargazers and professional astronomers alike.

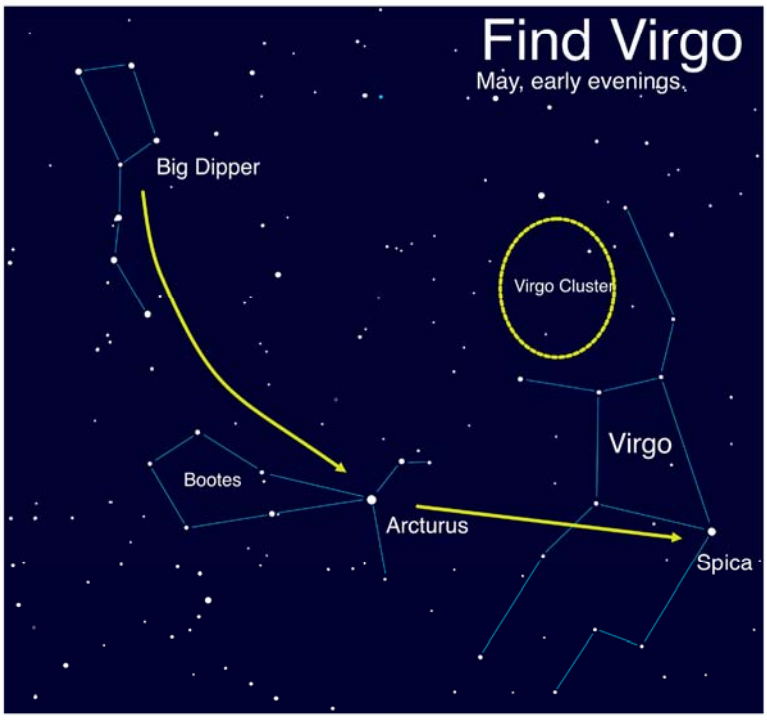
Virgo is the second-largest constellation and largest in the Zodiac, and easily spotted once you know how to spot Spica, its brightest star. How can you find it? Look to the North and start with the Big Dipper! Follow the general curve of the Dipper's handle away from its "ladle" and towards the bright orange-red star Arcturus, in Boötes – and from there continue straight until you meet the next bright star, Spica! This particular star-hopping trick is summed up by the famous phrase, "arc to Arcturus, and spike to Spica."

This large constellation is home to the Virgo Cluster, a massive group of galaxies. While the individual stars in Virgo are a part of our own galaxy, known as the Milky Way, the Virgo Cluster's members exist far beyond our own galaxy's borders. Teeming with around 2,000 known members, this massive group of galaxies are all gravitationally bound to each other, and are themselves members of the even larger Virgo Supercluster of galaxies, a sort of "super-group" made up of groups of galaxies. Our own Milky Way is a member of the "Local Group" of galaxies, which in turn is *also* a member of the Virgo Supercluster! In a sense, when we gaze upon the galaxies of the Virgo Cluster, we are looking at some of our most distant cosmic neighbors. At an average distance of over 65 million light years away, the light from these galaxies first started towards our planet when the dinosaurs were enjoying their last moments as Earth's dominant land animals! Dark clear skies and a telescope with a mirror of six inches or more will reveal many of the cluster's brightest and largest members, and it lends itself well to stunning astrophotos.

Virgo is naturally host to numerous studies of galaxies and cosmological research, which have revealed much about the structure of our universe and the evolution of stars and galaxies. The "Universe of Galaxies" activity can help you visualize the scale of the universe, starting with our home in the Milky Way Galaxy before heading out to the Local Group, Virgo Cluster and well beyond! You can find it at bit.ly/universeofgalaxies. You can further explore the science of galaxies across the Universe, along with the latest discoveries and mission news, at nasa.gov.



The first image of a black hole's event horizon was taken in the center of one of the most prominent galaxies in Virgo, M87! This follow up image, created by further study of the EHT data, reveals polarization in the radiation around the black hole. Mapping the polarization unveils new insights into how matter flows around and into the black hole - and even hints at how some matter escapes! More details: apod.nasa.gov/apod/ap210331.html
Credit: Event Horizon Telescope Collaboration



Find Virgo by "arcing to Arcturus, then spiking on to Spica." Please note that in this illustration, the location of the Virgo Cluster is approximate - the borders are not exact.